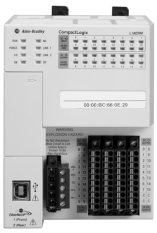
Allen-Bradley

# CompactLogix Controllers Specifications

## CompactLogix 5370 Controller Catalog Numbers

1769-L16ER-BB1B, 1769-L18ER-BB1B, 1769-L18ERM-BB1B, 1769-L30ER, 1769-L30ER-NSE, 1769-L30ERM, 1769-L33ER, 1769-L33ERM, 1769-L36ERM



## 1769 Packaged Controller Catalog Numbers

1769-L23-QBFC1B, 1769-L23E-QB1B, 1769-L23E-QBFC1B

## 1769 Modular Controller Catalog Numbers

1769-L31, 1769-L32C, 1769-L35CR, 1769-L32E, 1769-L35E

## 1768 Controller Catalog Numbers

1768-L43, 1768-L43S, 1768-L45, 1768-L45S

## Memory Card Catalog Numbers

1784-CF64, 1784-CF128, 1784-SD1, 1784-SD2

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**Table 1 - Environmental Specifications - 1768 and 1769 CompactLogix Controllers and CompactLogix 5370 Controllers**

| Attribute | 1769-L16ER-BB1B, 1769-L18ER-BB1B, 1769-L18ERM-BB1B | 1769-L30ER, 1769-L30ER-NSE, 1769-L30ERM, 1769-L33ER, 1769-L33ERM, 1769-L36ERM | 1769-L23-QBFC1B, 1769-L23E-QB1B, 1769-L23E-QBFC1B | 1769-L31, 1769-L32C, 1769-L35CR, 1769-L32E, 1769-L35E | 1768-L43, 1768-L43S, 1768-L45, 1768-L45S |
|---|---|---|---|---|---|
| Temperature, operating<br>IEC 60068-2-1 (Test Ad, Operating Cold),<br>IEC 60068-2-2 (Test Bd, Operating Dry Heat),<br>IEC 60068-2-14 (Test Nb, Operating Thermal Shock) | -20…60 °C<br>(-4…140 °F) | 0…60 °C<br>(32…140 °F) | | | |
| Temperature, storage<br>IEC 60068-2-1 (Test Ab, Unpackaged Nonoperating Cold),<br>IEC 60068-2-2 (Test Bb, Unpackaged Nonoperating Dry Heat),<br>IEC 60068-2-14 (Test Na, Unpackaged Nonoperating Thermal Shock) | -40…85 °C<br>(-40…185 °F) | | | | |
| Temperature, surrounding air, max | 60 °C (140 °F) | | | | |
| Relative humidity<br>IEC 60068-2-30 (Test Db, Unpackaged Damp Heat) | 5...95% noncondensing | | | | |
| Vibration<br>IEC 60068-2-6 (Test Fc, Operating) | 5 g @ 10…500 Hz | | 2 g @ 10…500 Hz | 5 g @ 10…500 Hz | |
| Shock, operating<br>IEC 60068-2-27 (Test Ea, Unpackaged Shock) | 30 g | 20 g - DIN rail<br>30 g - Panel | 30 g | 20 g - DIN rail<br>30 g - Panel | 30 g |
| Shock, nonoperating<br>IEC 60068-2-27 (Test Ea, Unpackaged Shock) | 50 g[(1)] | 30 g - DIN rail<br>40 g - Panel | 50 g | 30 g - DIN rail<br>40 g - Panel | 50 g |
| Emissions<br>CISPR 11 | Group 1, Class A | | | | |
| ESD immunity<br>IEC 61000-4-2 | 6 kV contact discharges<br>8 kV air discharges | | 4 kV contact discharges<br>8 kV air discharges | 1769-L31<br>4 kV contact discharges<br>8 kV air discharges<br><br>1769-L32C, 1769-L35CR, 1769-L32E, 1769-L35E<br>6 kV contact discharges<br>8 kV air discharges | 6 kV contact discharges<br>8 kV air discharges |

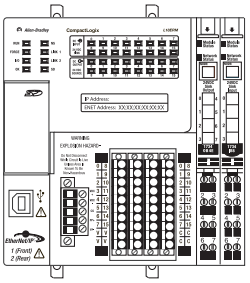
**Table 1 - Environmental Specifications - 1768 and 1769 CompactLogix Controllers and CompactLogix 5370 Controllers**

| Attribute | 1769-L16ER-BB1B, 1769-L18ER-BB1B, 1769-L18ERM-BB1B | 1769-L30ER, 1769-L30ER-NSE, 1769-L30ERM, 1769-L33ER, 1769-L33ERM, 1769-L36ERM | 1769-L23-QBFC1B, 1769-L23E-QB1B, 1769-L23E-QBFC1B | 1769-L31, 1769-L32C, 1769-L35CR, 1769-L32E, 1769-L35E | 1768-L43, 1768-L43S, 1768-L45, 1768-L45S |
|---|---|---|---|---|---|
| Radiated RF immunity<br>IEC 61000-4-3 | 10V/m with 1 kHz sine-wave 80% AM from 80…2000 MHz<br>10V/m with 200 Hz 50% Pulse 100% AM @ 900 MHz<br>10V/m with 200 Hz 50% Pulse 100% AM @ 1890 MHz<br>10V/m with 1 kHz sine-wave 80% AM from 2000…2700 MHz | | 10V/m with 200 Hz 50% Pulse 100% AM at 900 MHz<br>10V/m with 200 Hz 50% Pulse 100% AM at 1890 MHz<br>10V/m with 1 kHz sine-wave 80% AM from 80…2000 MHz<br>10V/m with 1 kHz sine-wave 80% AM from 2000…2700 MHz | 1769-L31, 1769-L32C, 1769-L35CR<br>10V/m with 1 kHz sine-wave 80% AM from 80…2000 MHz<br>10V/m with 200 Hz 50% Pulse 100% AM @ 900 MHz<br>10V/m with 200 Hz 50% Pulse 100% AM @ 1890 MHz<br><br>1769-L32E, 1769-L35E<br>10V/m with 1 kHz sine-wave 80% AM from 80…2000 MHz<br>10V/m with 200 Hz 50% Pulse 100% AM @ 900 MHz<br>10V/m with 200 Hz 50% Pulse 100% AM @ 1890 MHz<br>3V/m with 1 kHz sine-wave 80% AM from 2000…2700 MHz | 10V/m with 1 kHz sine-wave 80% AM from 80…2000 MHz<br>10V/m with 200 Hz 50% Pulse 100% AM @ 900 MHz<br>10V/m with 200 Hz 50% Pulse 100% AM @ 1890 MHz<br>3V/m with 1 kHz sine-wave 80% AM from 2000…2700 MHz |
| EFT/B immunity<br>IEC 61000-4-4 | ±3 kV at 5 kHz on power ports<br>±3 kV at 5 kHz on signal ports<br>±3 kV at 5 kHz on communication ports | ±3 kV at 5 kHz on communication ports | ±2 kV at 5 kHz on power ports<br>±2 kV at 5 kHz on signal ports<br>±2 kV at 5 kHz on communication ports | 1769-L31, 1769-L32C, 1769-L35CR<br>±2 kV at 5 kHz on communication ports<br>1769-L32E, 1769-L35E<br>±3 kV at 5 kHz on power ports<br>±3 kV at 5 kHz on communications ports | ±4 kV at 5 kHz on communication ports |
| Surge transient immunity<br>IEC 61000-4-5 | ± 1 kV line-line (DM) and ± 2 kV line-earth (CM) on power ports<br>± 1 kV line-line (DM) and ± 2 kV line-earth (CM) on signal sports<br>±2 kV line-earth (CM) on communication ports | ±2 kV line-earth (CM) on communication ports | ±1 kV line-line (DM) and ±2 kV line-earth (CM) on power ports<br>±1 kV line-line (DM) and ±2 kV line-earth (CM) on signal ports<br>±2 kV line-earth (CM) on shielded ports<br>±2 kV line-earth (CM) on communication ports | 1769-L31<br>Channel 0: ±2 kV line-earth (CM) on shielded ports<br>Channel 1: ±1 kV line-earth (CM) on shielded ports<br><br>1769-L32C, 1769-L35CR, 1769-L32E, 1769-L35E<br>±2 kV line-earth (CM) on communication ports | ±2 kV line-earth (CM) on communication ports |
| Conducted RF immunity<br>IEC 61000-4-6 | 10Vrms with 1 kHz sine-wave 80% AM from 150 kHz…80 MHz | | | | |

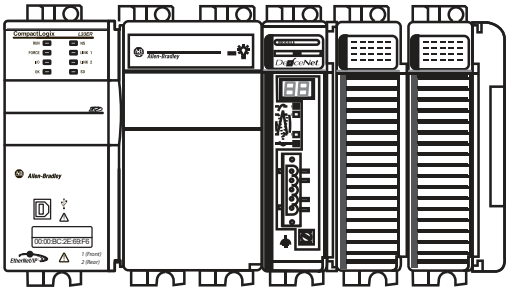
(1) If you are mounting a CompactLogix 5370 L1 controller on a EN 50 022 - 35 x 15 mm (1.38 x 0.59 in.) DIN rail, you must first adhere a bumper on the back of the controller. Failure to install the bumper before mounting the controller results in the system failing to meet this specification. For more information, see the CompactLogix 5370 Controllers User Manual, publication 1769-UM021.

# CompactLogix 5370 Controllers

CompactLogix 5370 L1 Control System



CompactLogix 5370 L3 Control System



CompactLogix™ 5370 controllers provide scalable controller solutions capable of addressing a wide variety of applications. All CompactLogix 5370 controllers provide the following functionality:

- Two EtherNet/IP ports
- One USB port
- Support for local expansion modules
- Control of local and distributed I/O modules
- Use of 1784-SD1 or 1784-SD2 secure digital (SD) card for nonvolatile flash memory
- Internal energy storage solution eliminating the need for a battery

Some CompactLogix 5370 controllers provide the following functionality:

- Built-in power supply
- Some combination of embedded digital, analog and high-speed counter modules
- Support for Integrated Motion over an EtherNet/IP network

**Table 2 - Features - CompactLogix 5370 Controllers**

| Feature | 1769-L16ER-BB1B, 1769-L18ER-BB1B, 1769-L18ERM-BB1B | 1769-L30ER, 1769-L30ER-NSE, 1769-L30ERM, 1769-L33ER, 1769-L33ERM, 1769-L36ERM |
|---|---|---|
| Controller tasks:<br>• Continuous<br>• Periodic<br>• Event | • 32 tasks<br>• 100 programs/task<br>• Event tasks: all event triggers<br>**IMPORTANT**: 1769-L16ER-BB1B, 1769-L18ER-BB1B, 1769-L18ERM-BB1B controllers support Event tasks via event triggers on embedded I/O modules. | |
| Built-in communication ports | • Two EtherNet/IP ports<br>• One USB port (for temporary connection only) | |
| Communication options | EtherNet/IP | • EtherNet/IP<br>• DeviceNet via 1769-SDN scanner module |
| EtherNet/IP node, max | • 1769-L16ER-BB1B: Up to four nodes<br>• 1769-L18ER-BB1B, 1769-L18ERM-BB1B: Up to eight nodes | • 1769-L30ER, 1769-L30ER-NSE, 1769-L30ERM: Up to 16 nodes<br>• 1769-L33ER, 1769-L33ERM: Up to 32 nodes<br>• 1769-L36ERM: Up to 48 nodes |
| Controller connections | 256 | |
| Embedded I/O modules | • 16 DC inputs<br>• 16 DC outputs | None |
| Sockets, max | 32 | |
| Integrated Motion over an EtherNet/IP network | 1769-L18ERM-BB1B - Up to 2 axes | 1769-L30ERM - Up to 4 axes<br>1769-L33ERM - Up to 8 axes<br>1769-L36ERM - Up to 16 axes |
| Programming languages | • Relay ladder<br>• Structured text<br>• Function block<br>• SFC | |

**Table 3 - Technical Specifications - CompactLogix 5370 Controllers**

| Attribute | 1769-L16ER-BB1B, 1769-L18ER-BB1B, 1769-L18ERM-BB1B | 1769-L30ER, 1769-L30ER-NSE, 1769-L30ERM, 1769-L33ER, 1769-L33ERM, 1769-L36ERM |
|---|---|---|
| User memory | • 1769-L16ER: 384 KB<br>• 1769-L18ER, 1769-L18ERM: 512 KB | • 1769-L30ER, 1769-L30ER-NSE, 1769-L30ERM: 1MB<br>• 1769-L33ER, 1769-L33ERM: 2 MB<br>• 1769-L36ERM: 3 MB |
| Optional flash memory | 1784-SD1 card with 1 Gb of available memory (shipped with controller)<br>1784-SD2 card with 2 Gb of available memory (available for separate ordering) | |
| Number of local expansion modules, max | • 1769-L16ER-BB1B: Six 1734 POINT I/O modules<br>• 1769-L18ER-BB1B, 1769-L18ERM-BB1B: Eight 1734 POINT I/O modules | • 1769-L30ER, 1769-L30ER-NSE, 1769-L30ERM: Eight 1769 Compact I/O™ modules<br>• 1769-L33ER, 1769-L33ERM: Sixteen 1769 Compact I/O modules<br>• 1769-L36ERM: Thirty 1769 Compact I/O modules |
| Number of I/O module banks, max | NA | 3 |
| Current draw @ 5V DC | 1 A | 500 mA |
| Current draw @ 24V DC | Power supply = 4 A Class 2<br>Output<br>• 500 mA, max per channel<br>• 3 A, max per module, pilot duty<br>Input = 5 mA | 225 mA |
| Power dissipation, max | Controller = 2.2 W<br>Backplane = 5 W<br>Power supply = 4.8 W<br>Total = 12 W | 4.5 W |
| Isolation voltage | 50V (continuous), Basic Insulation Type<br>Tested at 500V AC for 60 s, System to Field | 30V (continuous), Basic Insulation Type, USB to system, Ethernet to system and Ethernet to Ethernet<br>Type tested at 500V AC for 60 s |
| Weight, approx. | 0.66 kg (1.5lb) | 0.31 kg (0.68 lb) |
| Module width | 100.00 mm<br>(3.94 in.) | 100.00 mm<br>(3.94 in.) |
| Module location | DIN rail mount | DIN rail or panel mount |
| Panel-mounting screw torque | NA | 1.1...1.8 N•m (10...16 lb•in) - use M4 or #8 screws |
| Embedded power supply | 24V DC input, non-isolated | 1769-PA2, 1769-PB2, 1769-PA4, 1769-PB4 |
| Power supply distance rating | NA | • Controller and 1769-SDN: 4<br>• 1769 Compact I/O modules: 4…8, depending on module |
| Wire category(1) | 1 - signal ports<br>1 - power ports<br>2 - communication ports | 2 - communication ports |
| Wire type, Ethernet | RJ-45 connector according to IEC 60603-7, 2 or 4 pair Category 5e minimum cable according to TIA 568-B.1 or Category 5 cable according to ISO/IEC 24702 | |
| Wire size, power terminal | 0.051…3.31 $mm^2$ (30…12 AWG) solid or stranded copper wire rated at 75 °C (167 °F), or greater,<br>1.2 mm (3/64 in.) insulation max | NA |
| Wire type | Copper | NA |
| Wire size, embedded I/O connections | 0.205…1.31 $mm^2$ (24…16 AWG) solid or stranded copper wire rated at 75 °C (167 °F), or greater, 1.2 mm (3/64 in.) insulation max or 90 °C (194 °F) for CompactLogix | NA |
| North American temperature code | T4A | T5 |
| IEC temperature code | T4 | T5 |
| Enclosure type rating | None (open-style) | |

(1) Use this Conductor Category information for planning conductor routing. Refer to Industrial Automation Wiring and Grounding Guidelines, publication 1770-4.1 and the appropriate System Level Installation Manual.

## Real-time Clock Accuracy

The following table lists the real-time clock accuracy specifications for the CompactLogix 5370 controllers.

| Ambient Temperature | Accuracy |
|---|---|
| 0° C (32° F) | -143…42 s/month |
| 25° C (77° F) | -78…91 s/month |
| 40° C (104° F) | -101…73 s/month |
| 60° C (140° F) | -204…-4.50 s/month |

## Real-time Clock Holdup Times

The following table lists the typical real-time clock holdup specifications for the CompactLogix 5370 controllers.

**IMPORTANT** The values in the following table are typical and might vary with some CompactLogix 5370 control systems.

| Ambient Temperature | Holdup Time, Typical |
|---|---|
| 0 °C (32 °F) | 40 days |
| 25 °C (77 °F) | 35 days |
| 40 °C (104 °F) | 28 days |
| 60 °C (140 °F) | 16 days |

The I/O module support for CompactLogix 5370 controller systems varies by controller.

## I/O Module Support - CompactLogix 5370 L1 Controllers

The CompactLogix 5370 L1 controllers offer an embedded I/O module and the option of using 1734 POINT I/O™ modules as local expansion modules.

The embedded I/O module provides the following:

- Sixteen sinking 24V DC digital input points
- Sixteen sourcing 24V DC digital output points

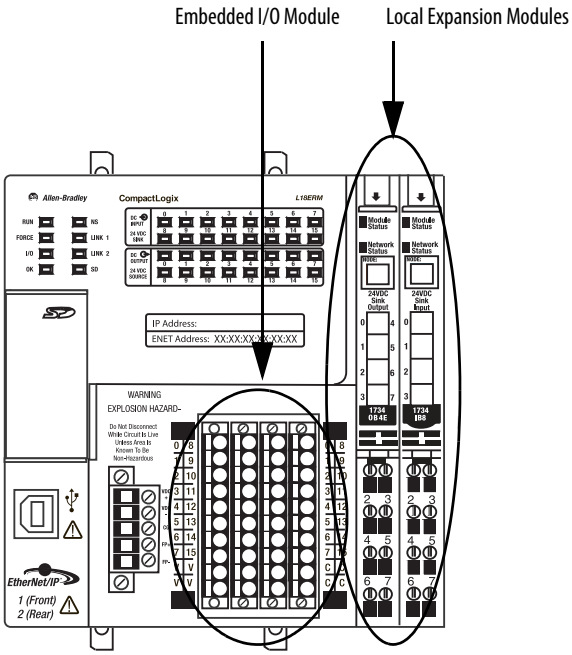
To use 1734 POINT I/O modules as local expansion modules, keep in mind the following:

- Local expansion modules must be installed in the same system as the CompactLogix 5370 L1 controller and power supply.
- The modules must be installed to the right of the power supply.
- The maximum number of local expansion modules available depends on the controller catalog of that system.

Table 4 lists the number of 1734 POINT I/O modules the CompactLogix 5370 L1 controllers support. Each I/O module's minimum RPI is 1.0 ms and can be changed by 0.5 ms increments.

**Table 4 - 1769-L16ER-BB1B, 1769-L18ER-BB1B, 1769-L18ERM-BB1B Controllers - Local I/O Module Support**

| Cat. No. | Local 1734 POINT I/O Modules Supported, max |
|---|---|
| 1769-L16ER-BB1B | 6 |
| 1769-L18ER-BB1B | 8 |
| 1769-L18ERM-BB1B | |



## *CompactLogix 5370 L1 Controllers' Local I/O Performance*

The requested packet interval (RPI) defines the frequency at which the controller sends data to and receives data from I/O modules. In RSLogix 5000 software, you set an RPI rate for each I/O module in your system.

The CompactLogix 5370 L1 controllers always attempt to scan an I/O module at the configured RPI rate. For individual I/O modules, a Module RPI Overlap minor fault occurs if there are enough I/O modules with RPI rates set too fast that they cannot all be serviced in the allotted interval.

The specific configuration parameters for a system determine the impact on actual RPI rates. These configuration factors can impact the effective scan frequency for any individual module:

- Rates at which other 1734 POINT I/O modules' RPI rates are set
- Number of other 1734 POINT I/O modules in the system
- Types of other 1734 POINT I/O modules in the system
- Application user task priorities

In general, follow these guidelines when setting the RPI rates in a CompactLogix 5370 L1 control system:

- For **digital** modules:
  - 1...2 modules can be scanned in 2 ms.
  - 3...4 modules can be scanned in 4 ms.
  - 5...8 modules can be scanned in 8 ms.

| **IMPORTANT** | When considering digital I/O modules, remember that they can be the embedded I/O module on the controller or 1734 POINT I/O modules used as Local Expansion Modules. Therefore, the consideration for using two modules can be the embedded I/O module and a 1734 POINT I/O module or two 1734 POINT I/O modules. |
|---|---|

- For **specialty and analog** modules (except 1734-ASC485 modules):
  - 1 module can be scanned at 20ms.
  - For each additional module add 20ms.

  For example, if a CompactLogix 5370 L1 control system uses two analog modules, the module can be scanned in 40 ms.

- For **1734-ASC485** modules, the sum total data size for all ASC modules determines the RPI rates:
  - For total data size less than 20 bytes, each module can be scanned in 20 ms.
  - For data size greater than 20 bytes, use the size value as the RPI.

  For example, if the total data size is 40 bytes, each ASC module can be scanned in 40 ms.

You are not required to set individual 1734 POINT I/O modules' RPI values to the values listed above. For example, if your application scans one or two modules, you do not have to use RPI rates of 2 ms. Remember, though, that higher RPI rates result in scanning the data less frequently.

The RPI shows how quickly modules can be scanned, not how quickly an application can use the data. The RPI is asynchronous to the program scan. Other factors, such as program execution duration, affect I/O throughput.

**Table 5 - Embedded DC Input Specifications**

| Attribute | 1769-L16ER-BB1B, 1769-L18ER-BB1B, 1769-L18ERM-BB1B Controllers |
|---|---|
| Inputs | 16 |
| Voltage category | 24V DC sink |
| Operating voltage range | 10…28.8V DC<br>24V DC nominal |
| Digital filter, off to on | 0.5 ms hardware plus 0…65 ms (user selectable |
| Input delay, off to on | |
| Digital filter, on to off | 0.5 ms hardware plus 0…65 ms (user selectable |
| Input delay, on to off | |
| Off-state voltage, max | 5V DC |
| Off-state current, max | 1.5 mA |
| On-state current, min | 2 mA @ 24V DC |
| Input impedance, max | 4.7 kΩ |
| Cyclic update time | 1 ms…750 ms |
| Isolation voltage | 50V DC (continuous), Basic Insulation Type<br>Tested at 500V AC for 60 s, system to field<br>No isolation between individual channels |
| IEC input compatibility | Type 3 |
| Isolated groups | None |

**Table 6 - Embedded DC Output Specifications**

| Attribute | 1769-L16ER-BB1B, 1769-L18ER-BB1B, 1769-L18ERM-BB1B Controllers |
|---|---|
| Outputs | 16 |
| Voltage category | 24V DC source |
| Operating voltage range | 10…28.8V DC<br>24V DC nominal |
| Output delay, off to on | 0.1 ms |
| Output delay, on to off | 0.1 ms |
| Off-state leakage current, max | 0.5 mA @ 24V DC |
| On-state current, min | 1 mA per channel |
| On-state voltage drop, max | 0.6V DC |
| Current per point, max | 0.5 A |
| Current per module, max | 3 A |
| Surge current per point, max | 1 A for 100 ms per point, repeatable every 2 s |
| Isolation voltage | 50V DC (continuous), Basic Insulation Type<br>Tested at 500V AC for 60 s, system to field<br>No isolation between individual channels |
| Isolated groups | None |
| Pilot duty rating | 0.5 A |

**Table 7 - Embedded Power Supply**

| Attribute | 1769-L16ER-BB1B, 1769-L18ER-BB1B, 1769-L18ERM-BB1B Controllers |
|---|---|
| Input voltage range | 10…28.8V DC |
| Input voltage, nom | 24V DC<br>Limit is Class 2 power supply @ 100 VA. |
| Line requirement, max | 100 VA @ 24V DC |
| Available 5V DC bus current | 1 A @ 5V DC |
| Inrush, max | 15 A |
| Line loss ride through | 10 ms…10 s |
| Output bus current capacity, max | 0.1 …3 A @ 5V DC |
| Minimum load current | 300 mA |
| Short circuit protection | Internal fuse<br>Not user replaceable |
| Overvoltage protection | Yes |

## I/O Module Support - CompactLogix 5370 L3 Controllers

The CompactLogix 5370 L3 controllers offer local expansion modules installed across up to three banks of modules. You must use 1769 Compact I/O modules with these controllers.

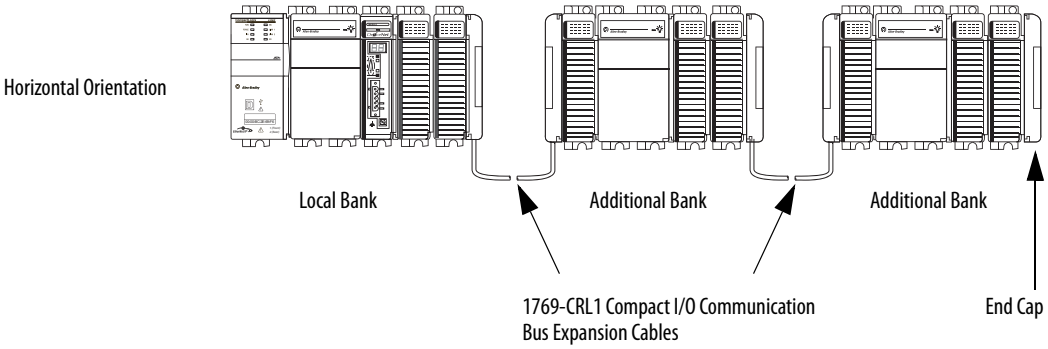
Remember the following when using I/O modules with the CompactLogix 5370 L3 controllers:

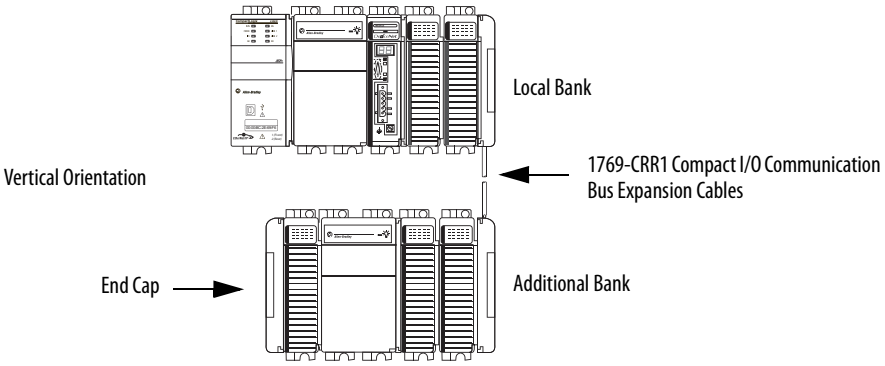
- The controller must be the leftmost module in the local bank of the system.
- The number of I/O modules supported in a controller system varies by controller catalog number.

| Cat. No. | Local 1769 Compact I/O Modules Supported, max |
|---|---|
| 1769- L30ER<br>1769-L30ERM<br>1769-L30ER-NSE | 8 |
| 1769-L33ER<br>1769-L33ERM | 16 |
| 1769-L36ERM | 30 |

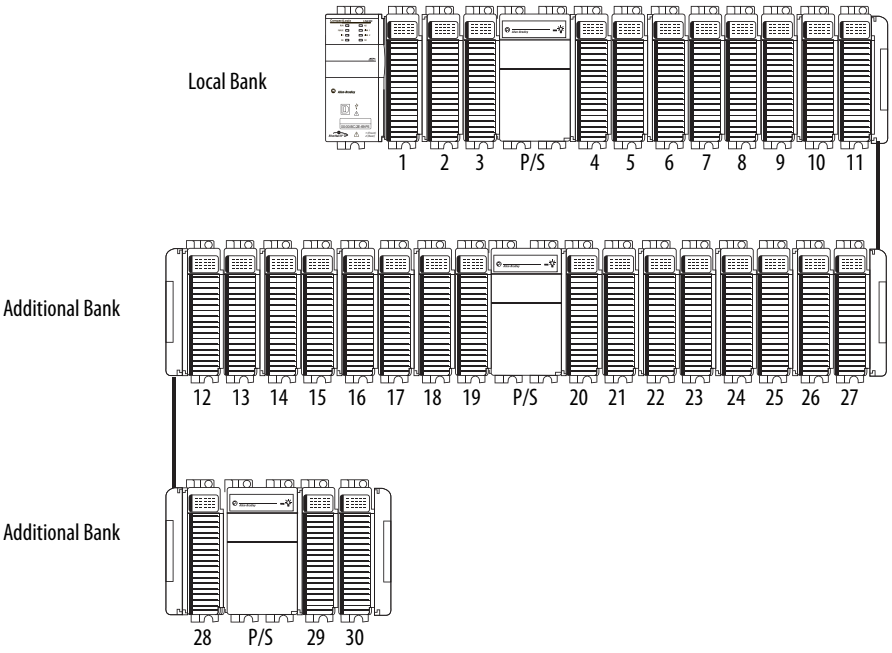
- You can install I/O modules in as many as three banks, that is, the local bank and two additional banks.
- You can install as many as three I/O modules between the controller and power supply.
- You can install as many as eight I/O modules to the right of the power supply in the local bank or on both the left and right sides of the power supply in additional banks.
- You must consider the controller's and all I/O modules' distance rating and current draw when designing you system.
- Systems with multiple banks can be installed vertically or horizontally.
- You must use expansion cables to connect banks in multi-bank systems.

- You must terminate the end of the last bank in a system.




The following graphic shows a 1769-L36ERM control system.



## *CompactLogix 5370 L3 Controllers' Local I/O Performance*

The requested packet interval (RPI) defines the frequency at which the controller sends data to and receives data from I/O modules. In RSLogix 5000™ software, you set an RPI rate for each I/O module in your system.

The CompactLogix 5370 L3 controllers always attempt to scan an I/O module at the configured RPI rate. If there is not enough system bandwidth, that is, if other, higher priority tasks prevent the Compact I/O subsystem task from completing before the next scheduled time for it to run again, an I/O Task Overlap minor fault occurs.

For individual I/O modules, a Module RPI Overlap minor fault occurs if there is at least one I/O module which cannot be serviced within its RPI time.

The specific configuration parameters for a system determine the impact on actual RPI rates. These configuration factors can impact the effective scan frequency for any individual module:

- Rates at which other 1769 Compact I/O modules' RPI rates are set
- Number of other 1769 Compact I/O modules in the system
- Types of other 1769 Compact I/O modules in the system
- Application user task priorities

**Table 8 - RPI Rate Guidelines**

| Type of Module | Guidelines |
|---|---|
| 1769 Compact I/O digital and analog (any mix) modules | The following guidelines apply:<br>• 1…2 modules can be scanned in 0.5 ms.<br>• 3…4 modules can be scanned in 1 ms.<br>• 5…30 modules can be scanned in 2 ms.<br>• Some input modules have a fixed 8 ms filter, so selecting a faster RPI has no effect. |
| 1769 Compact I/O specialty modules | The following conditions apply:<br>• For every full-sized 1769-SDN module in the system, increase every other module's RPI by 2 ms.<br>• For every 1769-HSC module in the system, increase every other module's RPI by 1 ms.<br>• For every full-sized 1769-ASCII module system, increase every other module's RPI by 1 ms.<br>• For every 1769-SM2 module in the system, increase every other module's RPI by 2 ms.<br>For example, if there are four digital I/O modules in the system configured with an RPI = 1 ms and a 1769-SDN module is added to the system, you should increase the RPI value for all four digital I/O modules by 2 ms. Therefore, when the 1769-SDN module is added to the system the four digital I/O modules should use an RPI = 3 ms.<br>If, in the same system, you add a second 1769-SDN module, the four digital I/O modules' RPI value should be increased to 5 ms. |

You can set individual 1769 Compact I/O modules' RPI values higher than those listed in Table 8. For example, if your application scans one or two modules, you do not have to use RPI values = 0.5 ms. You can set the RPI to a higher values, such as 1.0 ms, if necessary. Remember, higher RPI values result in scanning the data less frequently.

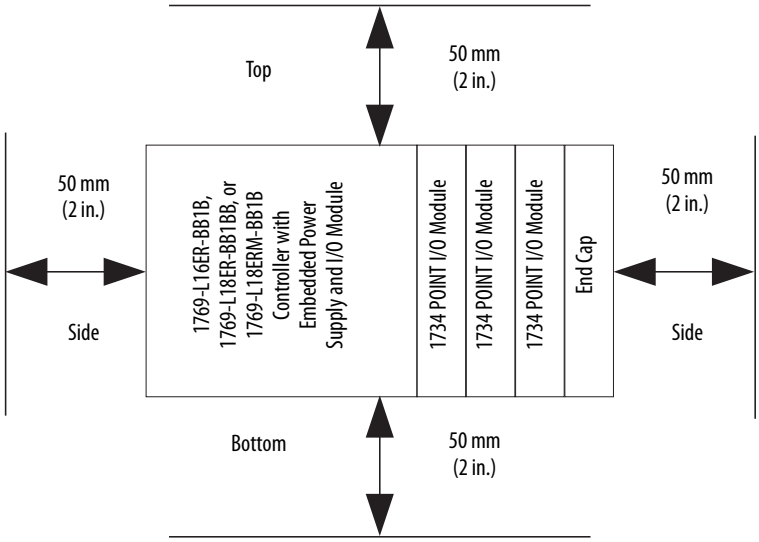
The RPI is asynchronous to the program scan. Other factors, such as program execution duration, affect I/O throughput.

**Table 9 - Certifications - CompactLogix 5370 Controllers**

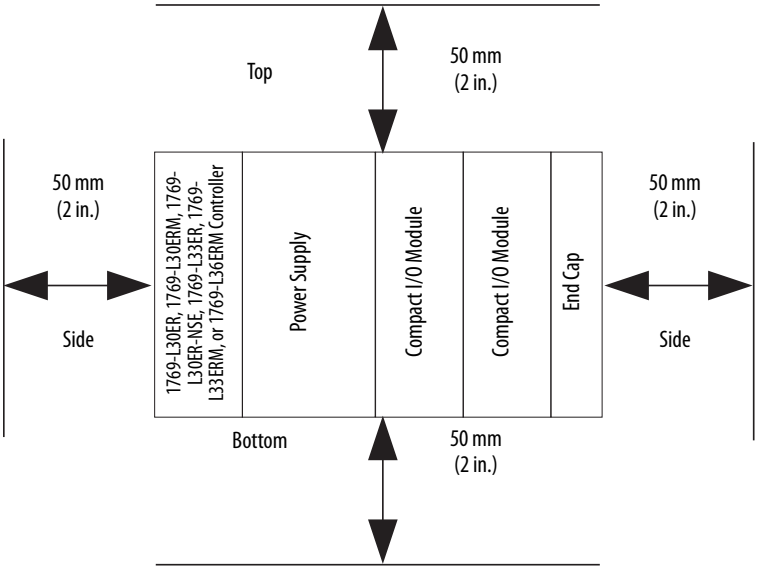
| Certification[1] | 1769-L16ER-BB1B, 1769-L18ER-BB1B, 1769-L18ERM-BB1B | 1769-L30ER, 1769-L30ER-NSE, 1769-L30ERM, 1769-L33ER, 1769-L33ERM, 1769-L36ERM |
|---|---|---|
| c-UL-us | UL Listed Industrial Control Equipment, certified for US and Canada. See UL File E65584.<br>UL Listed for Class I, Division 2 Group A,B,C,D Hazardous Locations, certified for U.S. and Canada. See UL File E194810. | |
| CE | European Union 2004/108/EC EMC Directive, compliant with:<br>• EN 61326-1; Meas./Control/Lab., Industrial Requirements<br>• EN 61000-6-2; Industrial Immunity<br>• EN 61000-6-4; Industrial Emissions<br>• EN 61131-2; Programmable Controllers (Clause 8, Zone A & B) | |
| C-Tick | Australian Radiocommunications Act, compliant with:<br>• AS/NZS CISPR 11; Industrial Emissions | |
| Ex | European Union 94/9/EC ATEX Directive, compliant with:<br>• EN 60079-15; Potentially Explosive Atmospheres, Protection "n"<br>• EN 60079-0; General Requirements<br>• II 3 G Ex nA IIC T4 X | European Union 94/9/EC ATEX Directive, compliant with:<br>• EN 60079-15; Potentially Explosive Atmospheres, Protection "n"<br>• EN 60079-0; General Requirements<br>• II 3 G Ex nA IIC T5 X |
| EtherNet/IP | ODVA conformance tested to EtherNet/IP specifications. | |
| KC | Korean Registration of Broadcasting and Communications Equipment, compliant with:<br>• Article 58-2 of Radio Waves Act, Clause 3 | |

(1) When marked. See the Product Certification link at http://www.ab.com for Declarations of Conformity, Certificates, and other certification details.

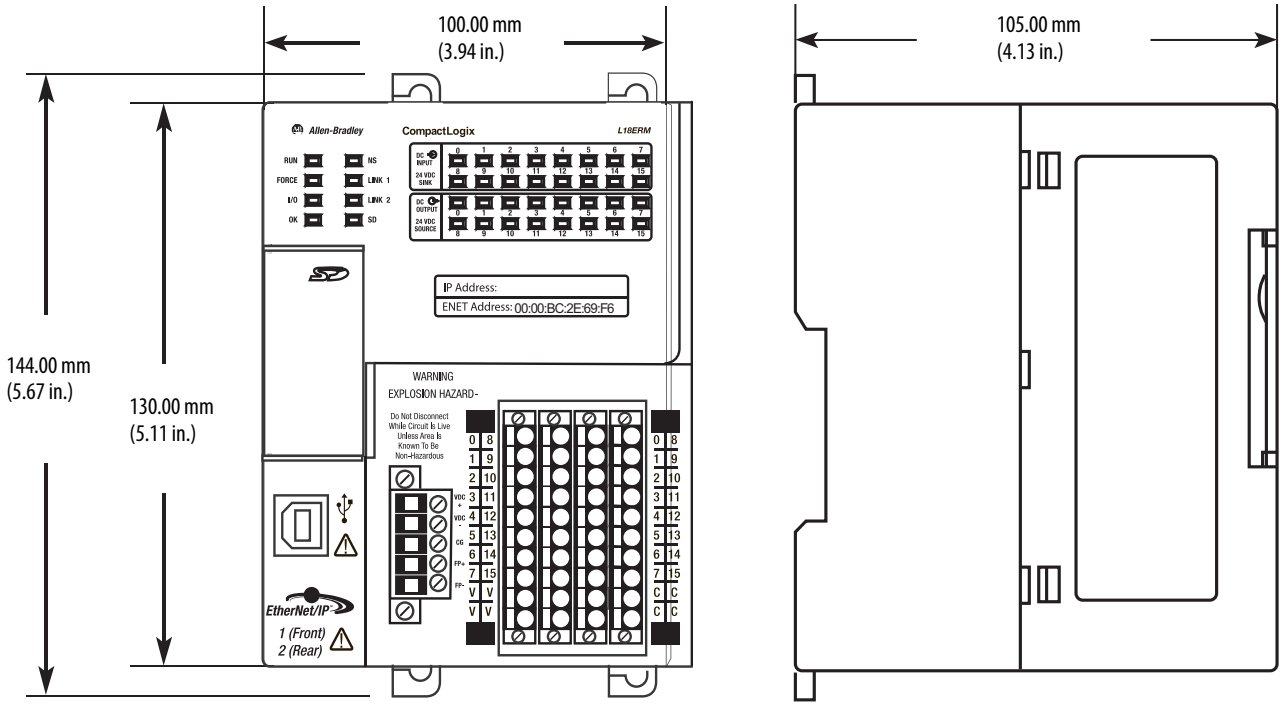
## CompactLogix 5370 L1 Controllers Minimum Spacing Requirements



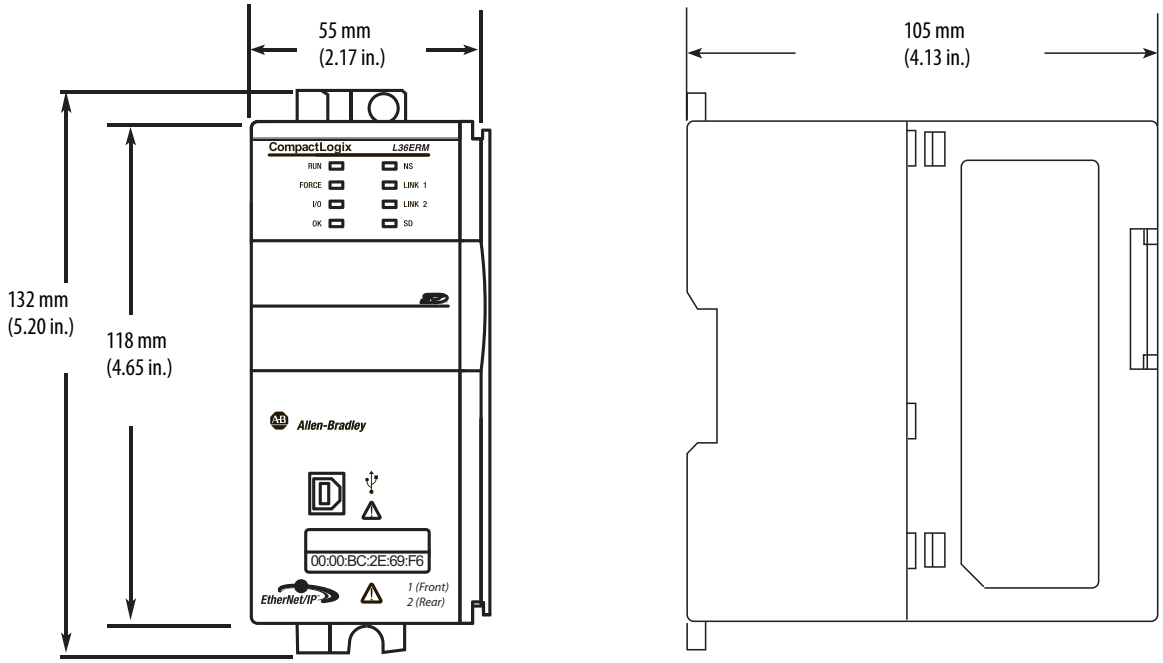

## CompactLogix 5370 L3 Controllers Minimum Spacing Requirements



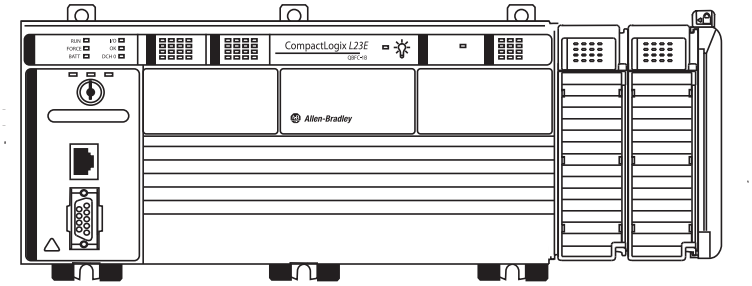
## CompactLogix 5370 L1 Controllers Dimensions




## CompactLogix 5370 L3 Controllers Dimensions



# 1769 Packaged CompactLogix Controllers with Embedded I/O




The 1769-L23*x* controllers provide the following functionality:

- Built-in power supply
- Either two serial ports or one serial and one EtherNet/IP port, depending on controller catalog number
- Combination of embedded digital, analog, and high-speed counter I/O modules
- 1769-ECR right-end cap

**Table 10 - Features - 1769 Packaged CompactLogix Controllers**

| Characteristic | 1769-L23E-QB1B | 1769-L23E-QBFC1B | 1769-L23-QBFC1B |
|---|---|---|---|
| Available user memory | 512 KB | 512 KB | 512 KB |
| CompactFlash card | None | None | None |
| Communication ports | 1 EtherNet/IP port<br>1 RS-232 serial port (DF1 or ASCII) | 1 EtherNet/IP port<br>1 RS-232 serial port (DF1 or ASCII) | 2 RS-232 ports (isolated DF1 or ASCII; nonisolated DF1 only) |
| Embedded I/O | • 16 DC inputs<br>• 16 DC outputs | • 16 DC inputs<br>• 16 DC outputs<br>• 4 analog inputs<br>• 2 analog outputs<br>• 4 high-speed counters | • 16 DC inputs<br>• 16 DC outputs<br>• 4 analog inputs<br>• 2 analog outputs<br>• 4 high-speed counters |
| Module expansion capacity | Up to three additional 1769 modules | Up to two additional 1769 modules | Up to two additional 1769 modules |
| Embedded power supply | 24V DC | 24V DC | 24V DC |

You can add one or two additional 1769 modules to the right of the controller package. The modules you can add depend on their current draw. Each packaged controller has the following amount of 5V DC bus current.

**Table 11 - 1769-L23*x* Available DC Current**

| Controller | Available 5V DC Bus Current |
|---|---|
| 1769-L23E-QB1B | 1000 mA |
| 1769-L23E-QBFC1B | 450 mA |
| 1769-L23-QBFC1B | 800 mA |

## 1769-L23*x* Local I/O Performance

The requested packet interval (RPI) defines the frequency at which the controller sends and receives all I/O data on the backplane. The default RPI is 5 ms. The combination of embedded I/O in the packaged controllers determines the fastest RPI you can configure.

| Controller | Guideline |
|---|---|
| 1769-L23E-QB1B | 1…4 modules can be scanned in 1.0 ms |
| 1769-L23E-QBFC1B<br>1769-L23-QBFC1B | • 1…4 modules can be scanned in 1.5 ms<br>• 5…6 modules can be scanned in 2.0 ms |

You can always select an RPI that is slower than listed above. These considerations show how fast modules can be scanned—not how fast an application can use the data. The RPI is asynchronous to the program scan. Other factors, such as program execution duration, affect I/O throughput.

**Table 12 - Technical Specifications - 1769 Packaged CompactLogix Controllers**

| Attribute | 1769-L23E-QB1B | 1769-L23E-QBFC1B | 1769-L23-QBFC1B |
|---|---|---|---|
| User memory | 512 KB | 512 KB | 512 KB |
| Optional flash memory | None | | |
| Number of expansion I/O modules, max | 3 (limited by current draw of module) | 2 (limited by current draw of module) | 2 (limited by current draw of module) |
| Replacement battery | 1769-BA | | |
| Current draw @ 5V DC | 1000 mA | 450 mA | 800 mA |
| Current draw @ 24V DC | 700 mA | 500 mA | 600 mA |
| Power dissipation | 7.01 W | 13.58 W | 10.73 W |
| Isolation voltage | 30V (continuous), basic insulation type<br>Type tested at 710V DC for 60 s; RS232 to system backplane, Ethernet to system backplane, and RS232 to Ethernet | | 30V (continuous), basic insulation type<br>Type tested at 710V DC for 60 s; RS232 channel 0 to system backplane, no isolation between RS232 channel 1 and system |
| Serial communication ports | CH0 - RS-232<br>DF1, DH-485, ASCII<br>Fully isolated<br>38.4 Kbps max | | CH0 - RS-232<br>DF1, DH-485, ASCII<br>Fully isolated<br>38.4 Kbps max<br>CH1 - RS-232<br>DF1, DH-485<br>Nonisolated<br>38.4 Kbps max |
| Serial cables | 1756-CP3 or 1747-CP3, right angle connector to controller, straight to serial port, 3 m (9.84 ft) | | |
| Weight, approx. | 0.91 kg (2 lb) | 1.22 kg (2.7 lb) | 1.22 kg (2.7 lb) |
| Slot width | 1 | | |
| Module location | DIN rail or panel mount | | |
| Mounting screw torque | 1.1...1.8 N●m (10...16 lb●in) - use M4 or #8 screws | | |
| Wire category(1) | 2 - on signal ports<br>2 - on power ports<br>2 - on communication ports | | |
| Wire type, Ethernet | RJ-45 connector according to IEC 60603-7, 2 or 4 pair Category 5e minimum cable according to TIA 568-B.1 or Category 5 cable according to ISO/IEC 24702 | | — |
| Wire size, DC power | 0.25…2.5 $mm^2$ (22…14 AWG) solid or stranded copper wire rated at 75 °C (167 °F) or greater, 1.2 mm (3/64 in.) insulation max | | |
| Wire size, discrete I/O connections | 0.5…0.8 $mm^2$ (20…18 AWG) solid or stranded copper wire rated at 75 °C (167 °F) or greater, 1.2 mm (3/64 in.) insulation max | | |
| Wire size, embedded analog and high-speed counter connections | 0.5…0.8 $mm^2$ (20…18 AWG) solid or stranded shielded copper wire rated at 75 °C (167 °F) or greater, 1.2 mm (3/64 in.) insulation max | | |
| North American temperature code | T3C | | |
| Enclosure type rating | None (open-style) | | |

(1) Use this conductor category information for planning conductor routing. See the Industrial Automation Wiring and Grounding Guidelines, publication 1770-4.1.

**Table 13 - Embedded DC Input Specifications**

| Attribute | 1769-L23E-QB1B, 1769-L23E-QBFC1B, 1769-L23-QBFC1B |
|---|---|
| Inputs | 16 (8 points/group) |
| Voltage category | 24V DC sink/source |
| Operating voltage range | 10...30V DC @ 30 °C (86 °F)<br>10...26.4V DC @ 60 °C (140 °F) |
| Digital filter, off to on | 0 s, 100 μs, 500 μs, 1 ms, 2 ms |
| Input delay, off to on | 100 μs (typical), 300 μs (max) |
| Digital filter, on to off | 0 s, 100 μs, 500 μs, 1 ms, 2 ms |
| Input delay, on to off | 250 μs (typical), 1 ms (max) |
| Off-state voltage, max | 5V DC |
| Off-state current, max | 1.5 mA |
| On-state current, min | 2 mA @ 10V DC |
| Inrush current, max | 250 mA |
| Input impedance, max | 3 kΩ |
| Cyclic update time | 100 μs...750 ms |
| Isolation voltage | 75V (continuous), basic insulation type<br>Type tested at 1200V AC for 60 s; inputs to system backplane and input group to input group |
| IEC input compatibility | Type 3 |
| Isolated groups | Group 1: inputs 0...7<br>Group 2: inputs 8...15<br>Isolated groups operate in either sink or source configurations |

**Table 14 - Embedded DC Output Specifications**

| Attribute | 1769-L23E-QB1B, 1769-L23E-QBFC1B, 1769-L23-QBFC1B |
|---|---|
| Outputs | 16 |
| Voltage category | 24V DC source |
| Operating voltage range | 20.4…26.4V DC |
| Output delay, off to on | 0.1 ms |
| Output delay, on to off | 1.0 ms |
| Off-state leakage current, max | 1.0 mA @ 26.4V DC |
| On-state current, min | 1.0 mA |
| On-state voltage drop, max | 1.0V DC @ 1.0 A |
| Current per point, max | 0.5 A @ 60 °C (140 °F)<br>1.0 A @ 30 °C (86 °F)<br>Also see the derating graphs |
| Current per module, max | 4.0 A @ 60 °C (140 °F)<br>8.0 A @ 30 °C (86 °F)<br>Also see the derating graphs on page 19 |
| Surge current per point | 2 A for 10 ms per point, repeatable every 2 s |
| Load current, min | 3 mA per point |
| Isolation voltage | 75V (continuous), basic insulation type<br>Type tested at 1200V AC for 60 s; outputs to system backplane |
| Isolated groups | Group 1: outputs 0...15 (internally connected to common) |
| Pilot duty rating | 0.5 A, 24V DC @ 60 °C (140 °F)<br>1.0 A, 24V DC @ 30 °C (86 °F) |

## *Embedded DC Output Temperature Derating*

The area within the curves represents the safe operating range for the embedded DC outputs under various conditions of user supplied voltages and ambient temperatures.

**Figure 1 - Embedded DC Outputs Maximum Amperes Per Point versus Temperature**

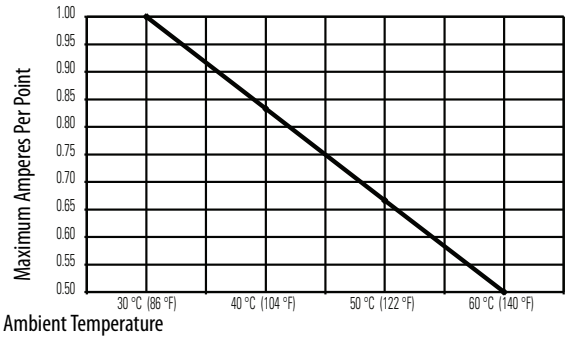



**Figure 2 - Embedded DC Outputs Maximum Amperes Per Module versus Temperature**

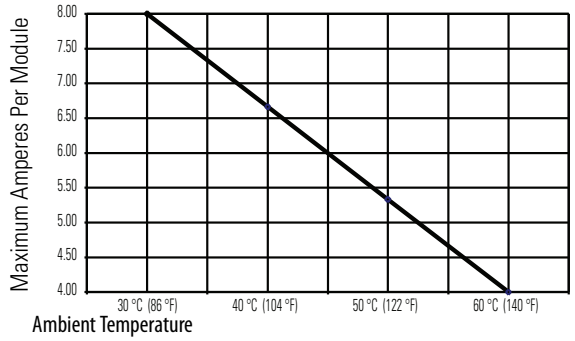



**Table 15 - Embedded Analog Input Specifications**

| Attribute | 1769-L23E-QB1B, 1769-L23E-QBFC1B, 1769-L23-QBFC1B |
|---|---|
| Inputs | 4 differential or single-ended |
| Input range | 0…10.5V<br>0…21 mA |
| Resolution | 8 bits plus sign (sign is always positive.) |
| Input impedance | Voltage: 150 kΩ nom<br>Current: 150 Ω nom |
| Converter type | Successive approximation |
| Response speed per channel | 5 ms |
| Rated working voltage | 30V AC/30V DC |
| Common mode voltage | 10V DC max per channel |
| Common mode rejection | Greater than 60 dB at 60 Hz at 10V between inputs and analog common |
| Normal mode rejection ratio | None |
| Accuracy, overall at 25 °C (77 °F)[1] | Voltage: ±0.7% full scale<br>Current: ±0.6% full scale |

**Table 15 - Embedded Analog Input Specifications**

| Attribute | 1769-L23E-QB1B, 1769-L23E-QBFC1B, 1769-L23-QBFC1B |
|---|---|
| Accuracy, overall at 0...60 °C (32...140 °F) | Voltage: ±0.9% full scale<br>Current: ±0.8% full scale |
| Accuracy drift with temperature | Voltage: ±0.006% per °C<br>Current: ±0.006% per °C |
| Calibration | Not required; accuracy is guaranteed by components |
| Non-linearity (in percent full scale) | ±0.4% |
| Repeatability | ±0.4% |
| Overload at input terminals, max | Voltage: 20V continuous, 0.1 mA<br>Current: 32 mA continuous, +5V DC |
| Channel diagnostics | Over-range by bit reporting |
| Isolation voltage | 30V (continuous), basic insulation type<br>Type tested at 500V AC for 60 s; inputs to system backplane and outputs to system backplane |

(1) Includes offset, gain, non-linearity, and repeatability error terms.

**Table 16 - Embedded Analog Output Specifications**

| Attribute | 1769-L23E-QB1B, 1769-L23E-QBFC1B, 1769-L23-QBFC1B |
|---|---|
| Outputs | 2 single-ended |
| Output range | 0…10.5V<br>0…21 mA |
| Converter type | Resistor string |
| Resolution, max | 8 bits plus sign (sign is always positive, Bit 15 = 0.) |
| Response speed per channel | 0.3 ms for rated resistance and rated inductance<br>3.0 ms for rated capacitance |
| Current load on voltage output | 10 mA max |
| Resistive load on current output | 0...300 Ω (includes wire resistance) |
| Load range on voltage output | > 1 kΩ at 10V DC |
| Inductive load, max (current outputs) | 0.1 mH |
| Capacitive load, max (Voltage Outputs) | 1 µF |
| Accuracy, overall at 25 °C (77 °F)(1) | Voltage: ±0.5% full scale<br>Current: ±0.5% full scale |
| Accuracy, overall at 0...60 °C (32...140 °F) | Voltage: ±0.6% full scale<br>Current: ±1.0% full scale |
| Accuracy drift with temperature | Voltage: ±0.01% full scale per °C<br>Current: ±0.01% full scale per °C |
| Output ripple range 0...50 kHz (referred to output range) | ±0.05% |
| Non-linearity | ±0.4% (in percent full scale) |
| Repeatability | ±0.05% (in percent full scale) |
| Output impedance | 10 Ω nom |
| Open and short-circuit protection | Yes |
| Short-circuit, max | Current: 40 mA |

### Table 16 - Embedded Analog Output Specifications

| Attribute | 1769-L23E-QB1B, 1769-L23E-QBFC1B, 1769-L23-QBFC1B |
|---|---|
| Open circuit, max | Voltage: 15V |
| Output response at system powerup and powerdown | +2.0…-1.0V DC spike for less than 6 ms |
| Isolation voltage | 30V (continuous), basic insulation type<br>Type tested at 500V AC for 60 s; inputs to system backplane and outputs to system backplane |

(1) Includes offset, gain, drift, non-linearity, and repeatability error terms.

### Table 17 - Embedded HSC Input Specifications

| Attribute | 1769-L23E-QB1B, 1769-L23E-QBFC1B, 1769-L23-QBFC1B |
|---|---|
| Input frequency, max | 250 kHz |
| Input current, max | 15 mA |
| Input current, min | 6.8 mA |
| Input voltage range | -30…30V DC(1) |
| On-state voltage range | 2.6…30V DC |
| On-state current, min | 6.8 mA |
| Off-state voltage, max | 1.0V DC |
| Off-state current, max | 1.5 mA |
| Off-state leakage current, max | 1.5 mA |
| Input impedance, nom | 1950 Ω |
| Pulse width, min | 2.5 µs |
| Phase separation, min | 1.084 µs |
| Isolation voltage | 75V (continuous), basic insulation type<br>Type tested at 1200V AC for 60 s; inputs to system backplane and input to input |

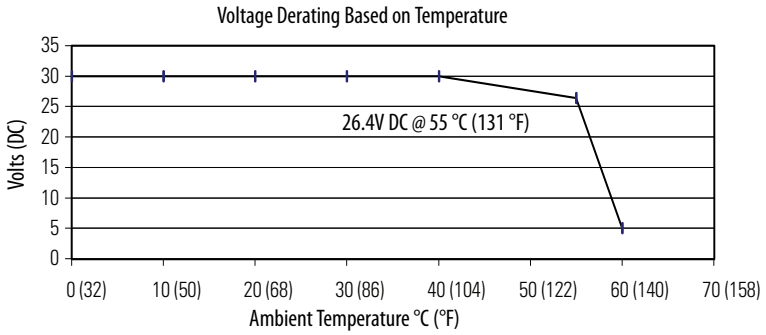
(1) See Maximum Input Voltage - 24V DC Operation temperature derating.

### Table 18 - Embedded HSC Output Specifications

| Attribute | 1769-L23E-QB1B, 1769-L23E-QBFC1B, 1769-L23-QBFC1B |
|---|---|
| Output voltage range | 5…30V DC |
| On-state voltage, max | User power - 0.1V DC |
| On-state output current, max | 1A per point |
| | 4A per module |
| On-state output current, min | 1 mA |
| On-state voltage drop, max | 0.5V DC |
| Off-state leakage current, max | 5 µA |
| Turn-on time, max | 400 µs |
| Turn-off time, max | 200 µs |
| Reverse polarity protection | 30V DC |
| Isolation voltage | 75V (continuous), basic insulation type<br>Type tested at 1200V AC for 60 s; inputs to system backplane and input to input |

## *Embedded HSC Temperature Derating*

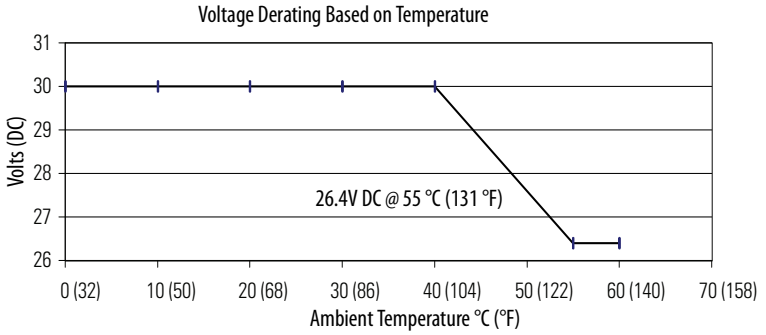
**Figure 3 - Maximum Input Voltage - 24V DC Operation**




| Temperature | Derated Voltage[1] |
|---|---|
| 0…40 °C (32…104 °F) | 30V DC |
| 55 °C (131 °F) | 26.4V DC |
| 60 °C (140 °F) | 5V DC |

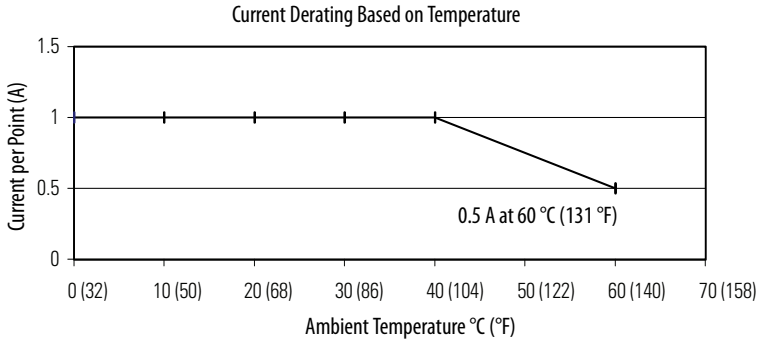
(1) Input voltage derating between 55 °C and 60 °C (131 °F and 140 °F) is achieved by using a dropping resistor.
For 24V DC input voltage, use a 2.4 kΩ, ½ Watt resistor.
For input voltages other than 24V DC, use a ½ Watt resistor with value: 125 x ($V_{in}$ - 5V).

**Figure 4 - Maximum Output Voltage - 24V DC Operation**



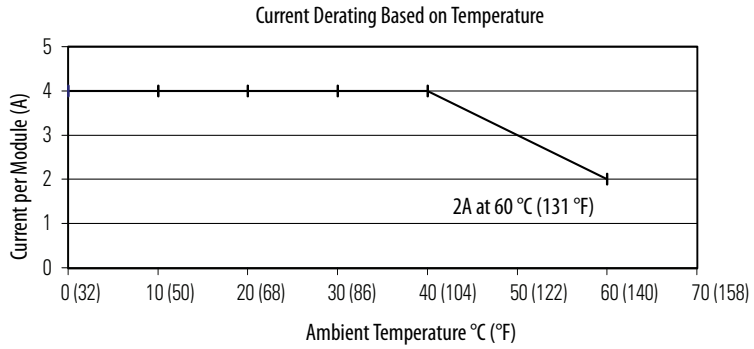

| Temperature | Derated Voltage |
|---|---|
| 0…40 °C (32...104 °F) | 30V DC |
| 55…60 °C (131...140 °F) | 26.4V DC |

**Figure 5 - Maximum Output Current per Point - 5V DC Operation**



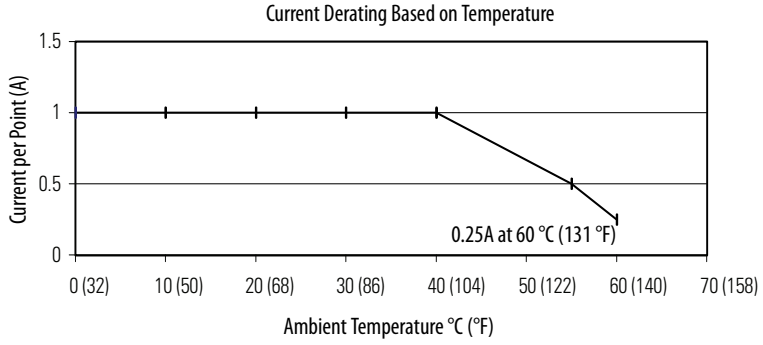

| Temperature | Derated Current |
|---|---|
| 0…40 °C (32…104 °F) | 1 A |
| 60 °C (140 °F) | 0.5 A |

**Figure 6 - Maximum Output Current per Module - 5V DC Operation**



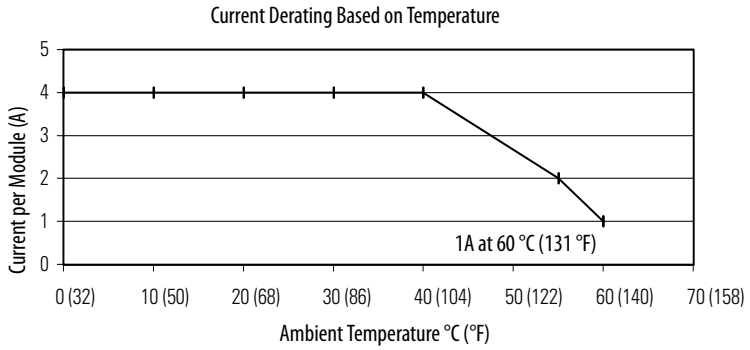

| Temperature | Derated Current |
|---|---|
| 0…40 °C (32…104 °F) | 4 A |
| 60 °C (140 °F) | 2 A |

**Figure 7 - Maximum Output Current per Point - 24V DC Operation**




| Temperature | Derated Current |
|---|---|
| 0...40 °C (32...104 °F) | 1 A |
| 55 °C (131 °F) | 0.5 A |
| 60 °C (140 °F) | 0.25 A |

**Figure 8 - Maximum Output Current per Module - 24V DC Operation**




| Temperature | Derated Current |
|---|---|
| 0…40 °C (32…104 °F) | 4 A |
| 55 °C (131 °F) | 2 A |
| 60 °C (140 °F) | 1 A |

**Table 19 - Embedded Power Supply**

| Attribute | 1769-L23E-QB1B, 1769-L23E-QBFC1B, 1769-L23-QBFC1B |
|---|---|
| Input voltage range | 19.2...31.2V DC |
| Input voltage, nom | 24V AC |
| Line requirement, max | 50VA at 24V DC |
| Available 5V DC bus current | 1769-L23E-QB1B: 1 A (1000 mA)<br>1769-L23E-QBFC1B: 450 mA<br>1769-L23-QBFC1B: 800 mA |
| Inrush, max | 30 A @ 31.2V DC |
| Line loss ride through | 10 ms…10 s |
| Output bus current capacity<br>0…55 °C (32…131°F)<br>55…60 °C (131…140 °F) | 2 A @ 5V DC<br>0.8 A @ 24V DC<br>See temperature derating graphs |
| Minimum load current | 0 mA @ 5V DC<br>0 mA @ 24V DC |
| Short circuit protection | Front access fuse<br>Replacement part number: Wickmann 19193-6.3A |
| Overvoltage protection | Yes |
| Isolation voltage | 75V (continuous), basic insulation type<br>Type tested at 1200V AC for 60 s; power to system backplane |

**Figure 9 - Embedded Power Supply Temperature Derating**

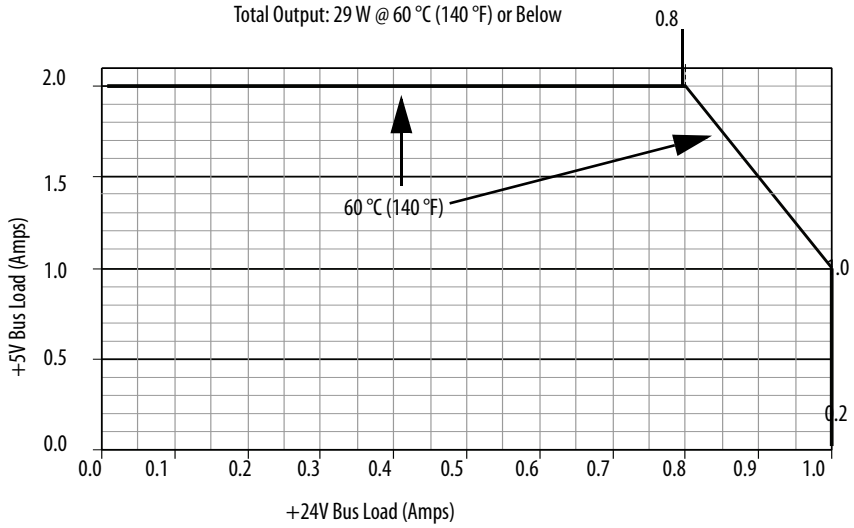
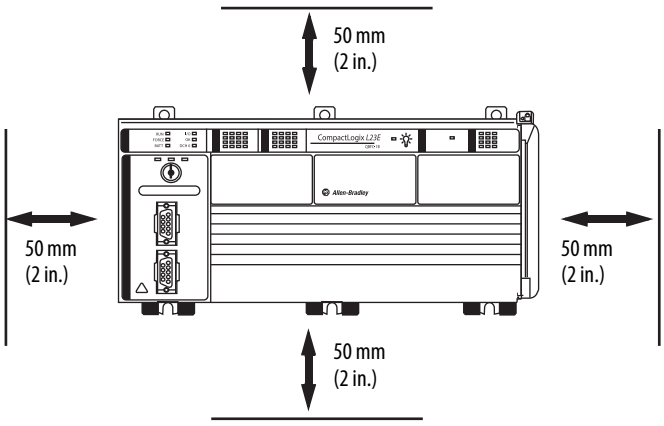



**Table 20 - Certifications - 1769 Packaged CompactLogix Controllers**

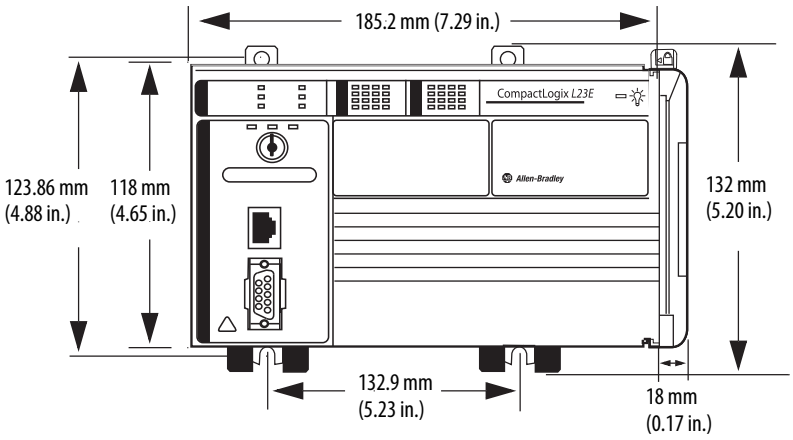
| Certification[1] | 1769-L23-QBFC1B, 1769-L23E-QB1B, 1769-L23E-QBFC1B |
|---|---|
| c-UL-us | UL Listed Industrial Control Equipment, certified for US and Canada. See UL File E65584.<br>UL Listed for Class I, Division 2 Group A,B,C,D Hazardous Locations, certified for U.S. and Canada. See UL File E194810. |
| CE | European Union 2004/108/EC EMC Directive, compliant with:<br>• EN 61326-1; Meas./Control/Lab., Industrial Requirements<br>• EN 61000-6-2; Industrial Immunity<br>• EN 61000-6-4; Industrial Emissions<br>• EN 61131-2; Programmable Controllers (Clause 8, Zone A & B) |
| C-Tick | Australian Radiocommunications Act, compliant with:<br>AS/NZS CISPR 11; Industrial Emissions |
| EtherNet/IP | ODVA conformance tested to EtherNet/IP specifications |
| KC | Korean Registration of Broadcasting and Communications Equipment, compliant with:<br>• Article 58-2 of Radio Waves Act, Clause 3 |

(1) When marked. See the Product Certification link at http://www.ab.com for Declarations of Conformity, Certificates, and other certification details.

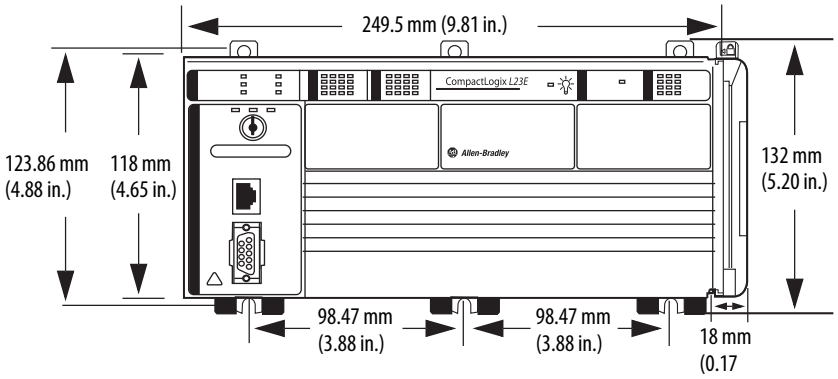
## 1769-L23*x* Minimum Spacing Requirements



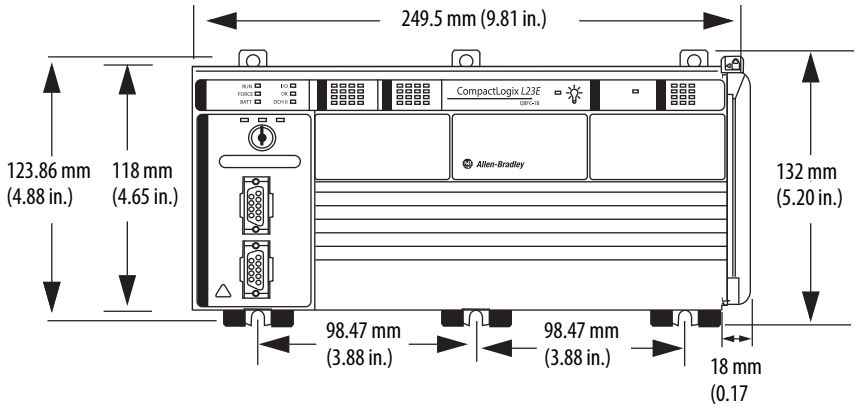

## 1769-L23E-QB1B CompactLogix Dimensions



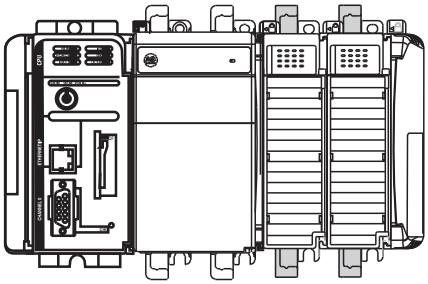
## 1769-L23E-QBFC1B CompactLogix Dimensions




## 1769-L23-QBFC1B CompactLogix Dimensions



# 1769 Modular CompactLogix Controllers

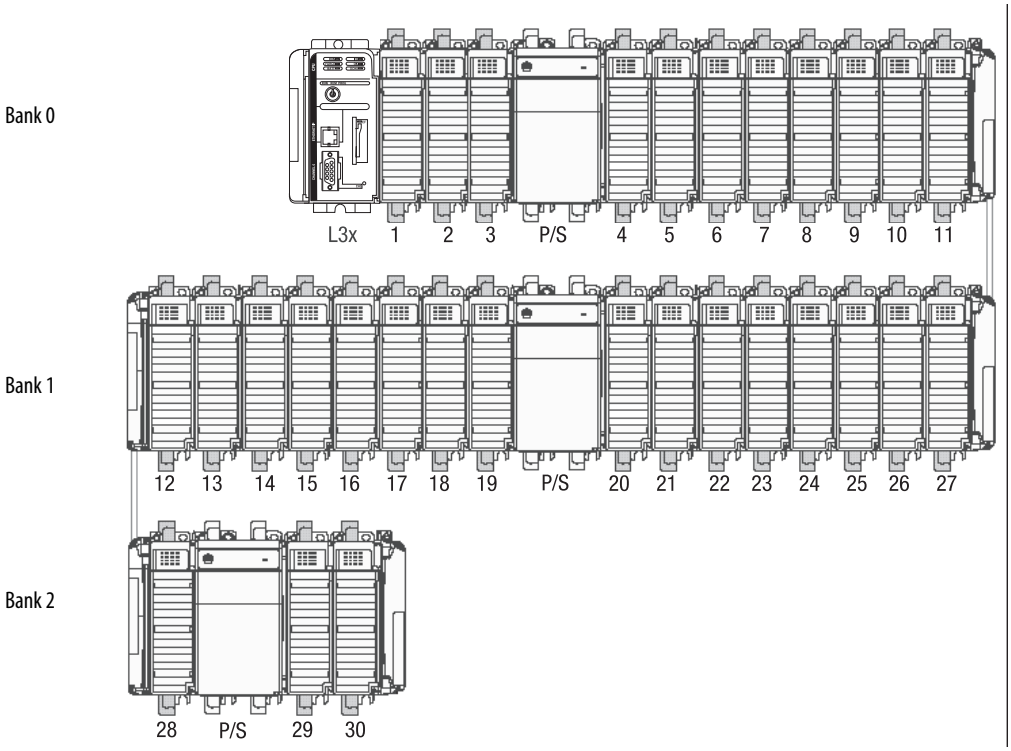


In a 1769-L3*x* controller system, the 1769 I/O modules can be placed to the left and the right of the power supply. As many as eight modules can be placed on each side of the power supply.

**Table 21 - Features - 1769 Modular CompactLogix Controllers**

| Characteristic | 1769-L31 | 1769-L32C | 1769-L32E | 1769-L35CR | 1769-L35E |
|---|---|---|---|---|---|
| Available user memory | 512 KB | 750 KB | 750 KB | 1.5 MB | 1.5 MB |
| CompactFlash card | • 1784-CF64<br>• 1784-CF128 | • 1784-CF64<br>• 1784-CF128 | • 1784-CF64<br>• 1784-CF128 | • 1784-CF64<br>• 1784-CF128 | • 1784-CF64<br>• 1784-CF128 |
| Communication ports | 2 RS-232 ports (isolated DF1 or ASCII; nonisolated DF1 only) | 1 ControlNet port<br>1 RS-232 serial port (DF1 or ASCII) | 1 EtherNet/IP port<br>1 RS-232 serial port (DF1 or ASCII) | 1 ControlNet port<br>1 RS-232 serial port (DF1 or ASCII) | 1 EtherNet/IP port<br>1 RS-232 serial port (DF1 or ASCII) |
| Module expansion capacity | 16 1769 modules | 16 1769 modules | 16 1769 modules | 30 1769 modules | 30 1769 modules |
| Power supply distance rating | 4 modules | 4 modules | 4 modules | 4 modules | 4 modules |

The CompactLogix controller has a power supply distance rating of four modules. The controller must be the leftmost module in the first bank of the system. The maximum configuration for the first bank of a CompactLogix controller is the controller and three I/O modules to the left of the power supply and eight I/O modules to the right of the power supply.



## 1769-L3*x* Local I/O Performance

You can configure an individual RPI for each local 1769 Compact I/O module. The RPI defines the frequency at which the controller sends and receives all I/O data on the backplane.

| Type of Module | Guideline |
|---|---|
| Digital and analog (any mix) | • 1…4 modules can be scanned in 1 ms<br>• 5…30 modules can be scanned in 2 ms<br>• Some input modules have a fixed 8 ms filter, so selecting a faster RPI has no effect |
| Specialty | • Full-sized 1769-SDN modules add 2 ms per module<br>• 1769-HSC modules add 1 ms per module<br>• Full-sized 1769-ASCII modules add 1 ms per module |

You can always select an RPI that is slower than listed above. These considerations show how fast modules can be scanned—not how fast an application can use the data. The RPI is asynchronous to the program scan. Other factors, such as program execution duration, affect I/O throughput.

**Table 22 - Technical Specifications - 1769 Modular CompactLogix Controllers**

| Attribute | 1769-L31 | 1769-L32C | 1769-L32E | 1769-L35CR | 1769-L35E |
|---|---|---|---|---|---|
| User memory | 512 KB | 750 KB | 750 KB | 1.5 MB | 1.5 MB |
| Optional flash memory | 1784-CF64<br>1784-CF128 | | | | |
| Number of I/O modules, max | 16 | 16 | 16 | 30 | 30 |
| Number of I/O banks, max | 3 | | | | |
| Number of expansion I/O modules, max | 16 1769 modules | | | 30 1769 modules | |
| Replacement battery | 1769-BA | | | | |
| Current draw @ 5V DC | 330 mA | 650 mA | 660 mA | 680 mA | 660 mA |
| Current draw @ 24V DC | 40 mA | 40 mA | 90 mA | 40 mA | 90 mA |
| Power dissipation | 2.61 W | 4.21 W | 5.5 W | 4.36 W | 5.5 W |
| Isolation voltage | 30V (continuous), basic insulation type<br>Type tested at 710V DC for 60 s; RS232 channel 0 to system<br>No isolation between RS232 channel 1 and system | 30V (continuous), basic insulation type<br>Type tested at 710V DC for 60 s; RS232 to system, ControlNet to system, RS232 to ControlNet, ControlNet channel A to ControlNet channel B | 30V (continuous), basic insulation type<br>Type tested at 710V DC for 60 s; RS232 to system, Ethernet to system, RS232 to Ethernet | 30V (continuous), basic insulation type<br>Type tested at 710V DC for 60 s; RS232 to system, ControlNet to system, RS232 to ControlNet, ControlNet channel A to ControlNet channel B | 30V (continuous), basic insulation type<br>Type tested at 710V DC for 60 s; RS232 to system, Ethernet to system, RS232 to Ethernet |
| Communication ports | CH0 - RS-232<br>DF1, DH-485, ASCII<br>Fully isolated<br>38.4 Kbps max<br>CH1 - RS-232<br>DF1, DH-485<br>Nonisolated<br>38.4 Kbps max | RS232<br>Fully isolated<br>38.4 Kbps max<br>ControlNet port | RS232<br>Fully isolated<br>38.4 Kbps max<br>EtherNet/IP port<br>10/100 BASE-T | RS232<br>Fully isolated<br>38.4 Kbps max<br>ControlNet port | RS232<br>Fully isolated<br>38.4 Kbps max<br>EtherNet/IP port<br>10/100 BASE-T |
| Serial cables | 1756-CP3 or 1747-CP3, right angle connector to controller, straight to serial port, 3 m | | | | |
| Weight, approx. | 0.30 kg (0.66 lb) | 0.32 kg (0.70 lb) | 0.30 kg (0.66 lb) | 0.32 kg (0.70 lb) | 0.30 kg (0.66 lb) |
| Slot width | 1 | | | | |
| Module location | DIN rail or panel mount | | | | |
| Panel-mounting screw torque | 1.1…1.8 N•m (10…16 lb•in) - use M4 or #8 screws | | | | |
| Power supply distance rating | 4 modules | | | | |
| Power supply | 1769-PA2, 1769-PB2, 1769-PA4, 1769-PB4 | | | | |
| Wire category[(1)] | 2 - on communication ports | | | | |

**Table 22 - Technical Specifications - 1769 Modular CompactLogix Controllers**

| Attribute | 1769-L31 | 1769-L32C | 1769-L32E | 1769-L35CR | 1769-L35E |
|---|---|---|---|---|---|
| North American temperature code | T5 | T4A | | | |
| IEC temperature code | NA | NA | T4 | NA | T4 |
| Enclosure type rating | None (open-style) | | | | |

(1) Use this conductor category information for planning conductor routing. See the Industrial Automation Wiring and Grounding Guidelines, publication 1770-4.1.

**Table 23 - Certifications - 1769 Modular CompactLogix Controllers**

| Certification(1) | 1769-L31 | 1769-L32C, 1769-L35CR | 1769-L32E, 1769-L35E |
|---|---|---|---|
| c-UL-us | UL Listed Industrial Control Equipment, certified for US and Canada. See UL File E65584.<br>UL Listed for Class I, Division 2 Group A,B,C,D Hazardous Locations, certified for U.S. and Canada. See UL File E194810. | | |
| CE | European Union 2004/108/EC EMC Directive, compliant with:<br>• EN 61326-1; Meas./Control/Lab., Industrial Requirements<br>• EN 61000-6-2; Industrial Immunity<br>• EN 61000-6-4; Industrial Emissions<br>• EN 61131-2; Programmable Controllers (Clause 8, Zone A & B) | | European Union 2004/108/EC EMC Directive, compliant with:<br>• EN 61000-6-2; Industrial Immunity<br>• EN 61000-6-4; Industrial Emissions |
| C-Tick | Australian Radiocommunications Act, compliant with:<br>AS/NZS CISPR 11; Industrial Emissions | | |
| EX | — | | European Union 94/9/EC ATEX Directive, compliant with:<br>• EN 60079-15; Potentially Explosive Atmospheres, Protection 'n'<br>• EN 60079-0; General Requirements (Zone 2)<br>• II 3 G Ex nA IIC T4 X |
| CI | — | ControlNet International conformance tested to ControlNet specifications | — |
| EtherNet/IP | — | — | ODVA conformance tested to EtherNet/IP specifications. |
| KC | Korean Registration of Broadcasting and Communications Equipment, compliant with:<br>• Article 58-2 of Radio Waves Act, Clause 3 | | |

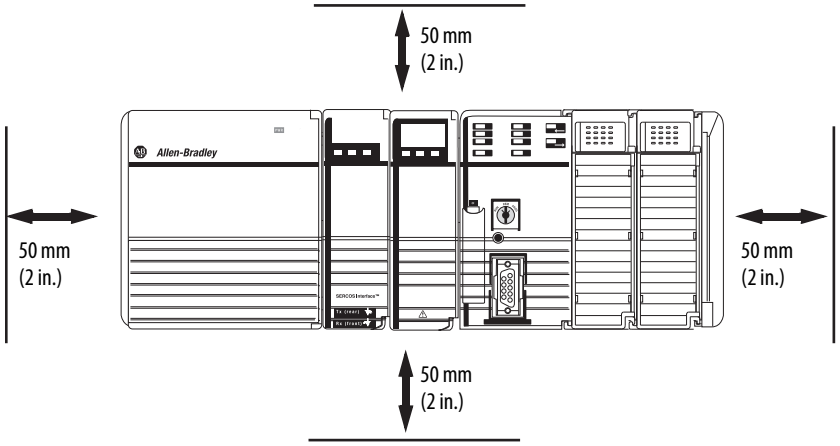
(1) When marked. See the Product Certification link at http://www.ab.com for Declarations of Conformity, Certificates, and other certification details.

## Real-time Clock Accuracy

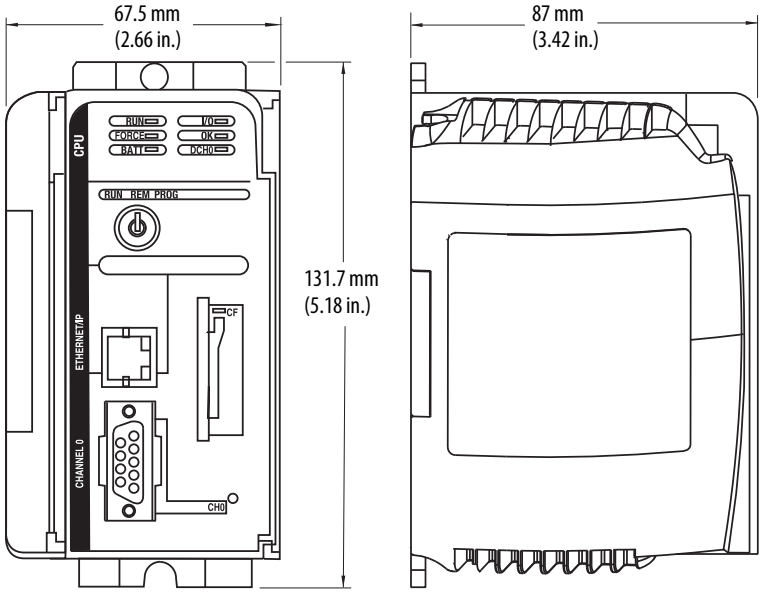
The following table lists the real-time clock accuracy specifications for the 1769 Modular CompactLogix controllers.

| Ambient Temperature | Accuracy |
|---|---|
| 0° C (32° F) | 54…-56 s/month |
| 25° C (77° F) | 9…-124 s/month |
| 40° C (104° F) | -84…-234 s/month |
| 55° C (131° F) | -228…-394 s/month |
| 60° C (140° F) | -287…-459 s/month |

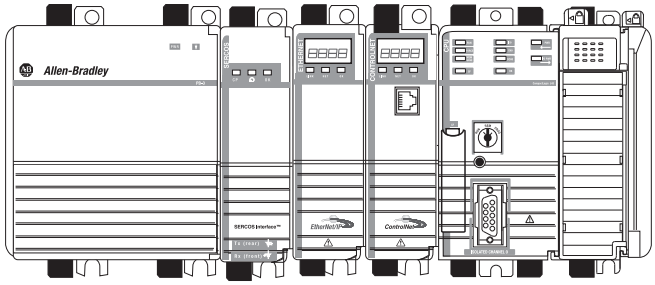
## 1769-L3*x* Minimum Spacing Requirements




## 1769-L3*x* CompactLogix Dimensions



# 1768 CompactLogix Controllers




The 1768-L4*x* controller combines both a 1768 backplane and a 1769 backplane. The 1768 backplane supports the 1768 controller, the 1768 power supply, and a maximum of four 1768 modules. The 1769 backplane supports 1769 modules.

**Table 24 - Features - 1768 CompactLogix Controllers**

| Characteristic | 1768-L43 | 1768-L43S | 1768-L45 | 1768-L45S |
|---|---|---|---|---|
| Available user memory | 2 MB | 2 MB standard<br>0.5 MB safety | 3 MB | 3 MB standard<br>1 MB safety |
| CompactFlash card | 1784-CF64<br>1784-CF128 | | 1784-CF64<br>1784-CF128 | |
| Communication options | • EtherNet/IP (standard and safety)<br>• ControlNet (standard and safety)<br>• DeviceNet (standard) | | • EtherNet/IP (standard and safety)<br>• ControlNet (standard and safety)<br>• DeviceNet (standard) | |
| Serial communication port | 1 RS-232 port | | 1 RS-232 port | |
| Module expansion capacity | • 2 1768 modules<br>• 16 1769 modules | | • 4 1768 modules[1]<br>• 30 1769 modules | |
| Power supply distance rating | — | | — | |
| Programming languages | • Relay ladder<br>• Structured text<br>• Function block<br>• Sequential function chart | • Standard task: all languages<br>• Safety task: relay ladder, safety application instructions | • Relay ladder<br>• Structured text<br>• Function block<br>• Sequential function chart | • Standard task: all languages<br>• Safety task: relay ladder, safety application instructions |

(1) With RSLogix 5000 software, version 20 and later, the 1768-L45 and 1768-L45S controllers support as many as three 1768-ENBT modules. This is an increase from the two modules that were supported with the previous versions of RSLogix 5000 software.

## Compact GuardLogix Safety System

The Compact GuardLogix® controller is a 1768-L4*x*S CompactLogix controller that provides safety control to achieve SIL 3/PLe according to ISO 13849. A major benefit of this system is that it's still a single project, safety and standard together.

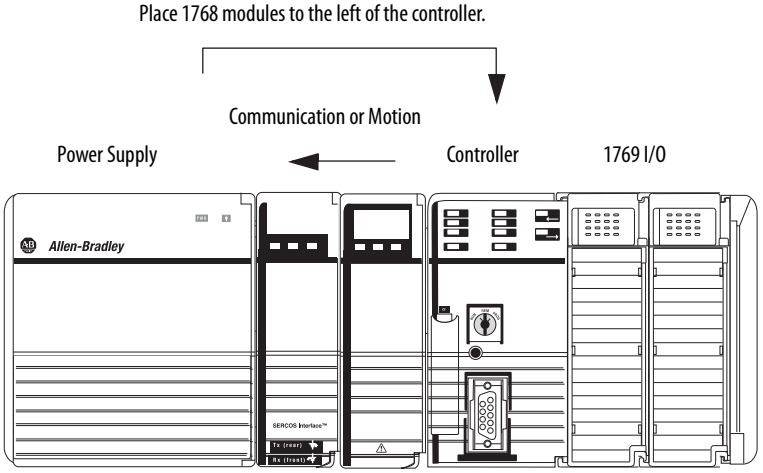
| Application | Description |
|---|---|
| SIL 1, 2, 3 | The Compact GuardLogix controller system is type-approved and certified for use in safety applications up to and including SIL 3 according to IEC 61508, and applications up to and including PLe/Cat.4 according to ISO 13849-1. For more information, see:<br>• GuardLogix Controllers Systems Safety Reference Manual, publication 1756-RM093.<br>• Compact GuardLogix Controllers User Manual, publication 1768-UM002.<br>• GuardLogix Safety Application Instruction Set Reference Manual, publication 1756-RM095. |

During development, safety and standard have the same rules, multiple programmers, online editing, and forcing are all allowed. Once the project is tested and ready for final validation, you apply the safety application signature and safety-lock the application to set the safety task to a SIL 3 integrity level, which is then enforced by the GuardLogix controller. When safety memory is locked and protected, the safety logic can't be modified and all safety functions operate with SIL 3 integrity. On the standard side of the GuardLogix controller, all functions operate like a regular Logix controller. Thus online editing, forcing, and other activities are all allowed.

With this level of integration, safety memory can be read by standard logic and external devices, like HMIs or other controllers, eliminating the need to condition safety memory for use elsewhere. The result is easy system-wide integration and the ability to display safety status on displays or marquees. Use Guard I/O modules for field device connectivity. For safety interlocking between GuardLogix controllers use Ethernet or ControlNet networks. Multiple GuardLogix controllers can share safety data for zone to zone interlocking, or a single GuardLogix controller can use remote distributed safety I/O between different cells/areas.

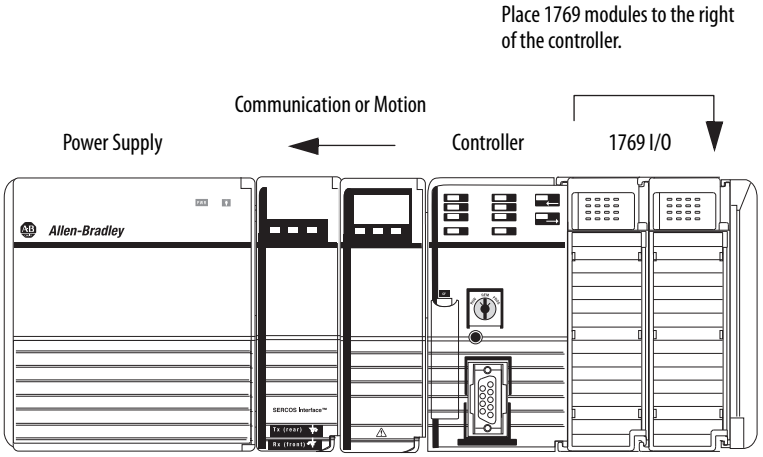
## 1768-L4*x* Placement

In a 1768-L4*x* controller system, place 1768 modules between the power supply and the controller.




Place 1769 modules to the right of the 1768 backplane.

- As many as eight 1769 modules can be attached to the right of the 1768 system.
- The 1769 I/O connected directly to the 1768 backplane does not need a 1769 power supply.
- Additional 1769 modules must be in additional I/O banks.
- Each additional I/O bank must have its own 1769 power supply.



## 1768-L4*x* Local I/O Performance

Configure an individual RPI for each local 1769 Compact I/O module. Use the default RPI numbers that the software automatically assigns or select faster RPI values as fast as 1 ms I/O module update times do not affect overall 1768 bus performance.

- Use faster RPI values for time critical I/O without impacting overall 1769 Compact I/O performance.
- Use Immediate Output (IOT) instructions for further reduction in I/O module update times.

**Table 25 - Technical Specifications - 1768 CompactLogix Controllers**

| Attribute | 1768-L43 | 1768-L43S | 1768-L45 | 1768-L45S |
|---|---|---|---|---|
| User memory | 2 MB | 2 MB standard<br>0.5 MB safety | 3 MB | 3 MB standard<br>1 MB safety |
| Optional flash memory | 1784-CF64<br>1784-CF128 | | | |
| Number of 1768 modules, max | 2 | | 4 | |
| Number of 1768 communication modules, max | 2 | | | |
| Number of 1768 motion modules, max | 2 | | 4 | |
| Number of 1769 I/O modules, max | 16 | | 30 | |
| Number of I/O banks, max | 2 | | 3 | |
| Replacement battery | None needed | | | |
| Backplane current draw @ 24V DC | 1.3 A | 1.4 A | 2.0 A | 2.1 A |
| 1768 current draw @ 5V DC | 2.8 A | | 5.6 A | |
| 1769 current draw @ 5V DC | 2.0 A | | 2.0 A | |
| Total 1768 and 1769 current draw @ 5V DC | 4.8 A | | 7.6 A | |
| Power dissipation | 6.3 W | 7.5 W | 8.3 W | 9.5 W |
| Power consumption | 31.3 W | 33.6 W | 48.0 W | 50.4 W |
| Isolation voltage | 30V (continuous), functional insulation type<br>Type tested at 500V AC for 60 s; RS-232 to system | | | |
| Communication ports | RS-232<br>Fully isolated, 38.4 Kbps max | | | |
| Serial cables | 1756-CP3 or 1747-CP3, right angle connector to controller, straight to serial port, 3 m | | | |
| Weight, approx. | 0.34 kg (11.99 oz) | 0.45 kg (15.9 oz) | 0.34 kg (11.99 oz) | 0.45 kg (15.9 oz) |
| Dimensions | 131.6 x 67.4 x 121.8 mm<br>(5.18 x 2.65 x 4.80 in.) | 131.6 x 90 x 121.8 mm<br>(5.18 x 3.55 x 4.80 in.) | 131.6 x 67.4 x 121.8 mm<br>(5.18 x 2.65 x 4.80 in.) | 131.6 x 90 x 121.8 mm<br>(5.18 x 3.55 x 4.80 in.) |
| Slot width | 1 | 1.5 | 1 | 1.5 |
| Module location | DIN rail or panel mount | | | |
| Panel-mounting screw torque | 1.16 N•m (10 lb•in) - use M4 or #8 screws | | | |
| Power supply distance rating | 4 modules | | | |
| Power supply | 1768-PA3, 1768-PB3 | | | |
| Wire category(1) | 2 - on communication ports | | | |
| IEC temperature code | N/A | T4 | N/A | T4 |
| North American temperature code | T4 | | | |
| Enclosure type rating | None (open-style) | | | |

(1) Use this conductor category information for planning conductor routing as described in the system level installation manual. See the Industrial Automation Wiring and Grounding Guidelines, publication 1770-4.1.

**Figure 10 - 1768-L43 and 1768-L43S Power Dissipation**

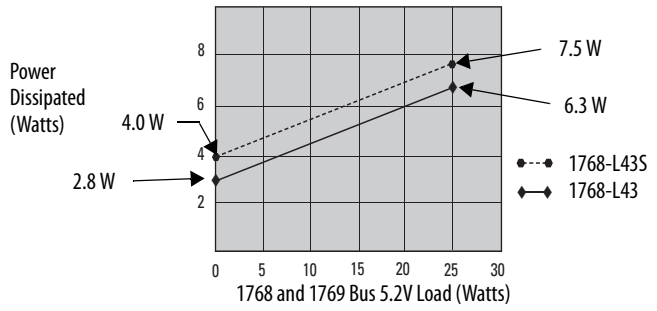



**Figure 11 - 1768-L45 and 1768-L45S Power Dissipation**

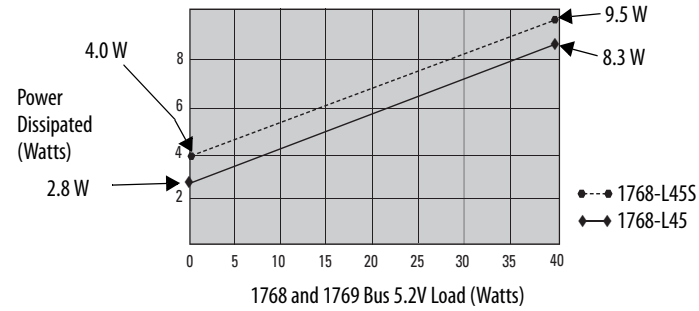



**Table 26 - Certifications - 1768 CompactLogix Controllers**

| Certification[1] | 1768-L43, 1768-L45 |
|---|---|
| c-UL-us | UL Listed Industrial Control Equipment, certified for US and Canada. See UL File E65584.<br>UL Listed for Class I, Division 2 Group A,B,C,D Hazardous Locations, certified for U.S. and Canada. See UL File E194810. |
| CE | European Union 2004/108/EC EMC Directive, compliant with:<br>• EN 61326-1; Meas./Control/Lab., Industrial Requirements<br>• EN 61000-6-2; Industrial Immunity<br>• EN 61000-6-4; Industrial Emissions<br>• EN 61131-2; Programmable Controllers (Clause 8, Zone A & B) |
| C-Tick | Australian Radiocommunications Act, compliant with:<br>AS/NZS CISPR 11; Industrial Emissions |
| KC | Korean Registration of Broadcasting and Communications Equipment, compliant with:<br>• Article 58-2 of Radio Waves Act, Clause 3 |

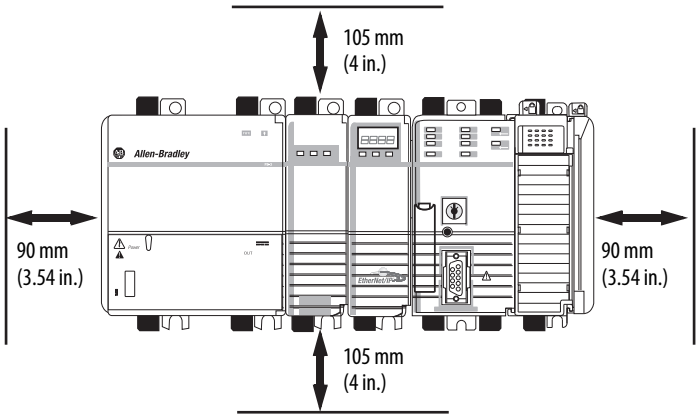
(1) When marked. See the Product Certification link at http://www.ab.com for Declarations of Conformity, Certificates, and other certification details.

**Table 27 - Certifications - 1768 Compact GuardLogix Controllers**

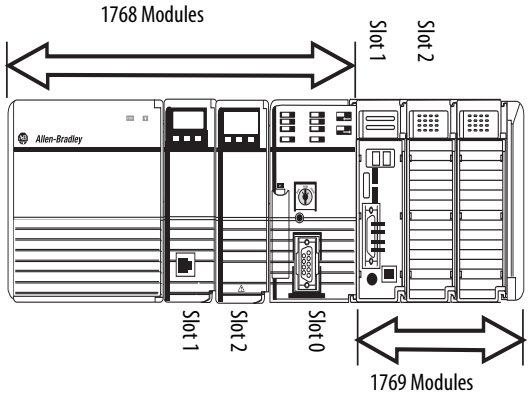
| Certification[1] | 1768-L43S, 1768-L45S |
|---|---|
| c-UL-us | UL Listed Industrial Control Equipment, certified for US and Canada. See UL File E65584.<br>UL Listed for Class I, Division 2 Group A,B,C,D Hazardous Locations, certified for U.S. and Canada. See UL File E194810. |
| CE | European Union 2004/108/EC EMC Directive, compliant with:<br>• EN 61326-1; Meas./Control/Lab., Industrial Requirements<br>• EN 61000-6-2; Industrial Immunity<br>• EN 61000-6-4; Industrial Emissions<br>• EN 61131-2; Programmable Controllers (Clause 8, Zone A & B) |
| C-Tick | Australian Radiocommunications Act, compliant with:<br>AS/NZS CISPR 11; Industrial Emissions |
| Ex | European Union 94/9/EC ATEX Directive, compliant with:<br>• EN 60079-15; Potentially Explosive Atmospheres, Protection 'n'<br>• EN60079-0; General Requirements<br>• II 3 G Ex nA IIC T4 X |
| KC | Korean Registration of Broadcasting and Communications Equipment, compliant with:<br>• Article 58-2 of Radio Waves Act, Clause 3 |
| Functional Safety[2] | Certified by TÜV: capable of SIL 1 to 3, according to IEC 61508; and PLe/Cat. 4 according to ISO 13849-1 |

(1) When marked. See the Product Certification link at http://www.ab.com for Declarations of Conformity, Certificates, and other certification details.
(2) When used with specified software versions.

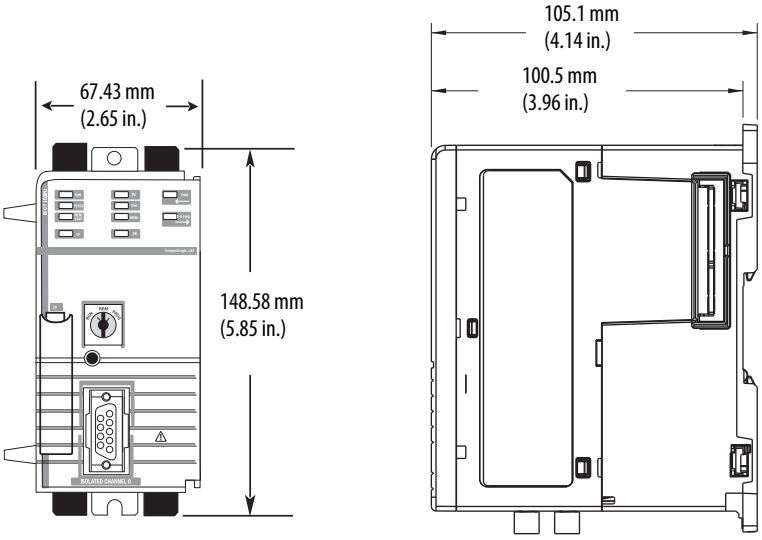
## 1768-L4*x* Minimum Spacing Requirements



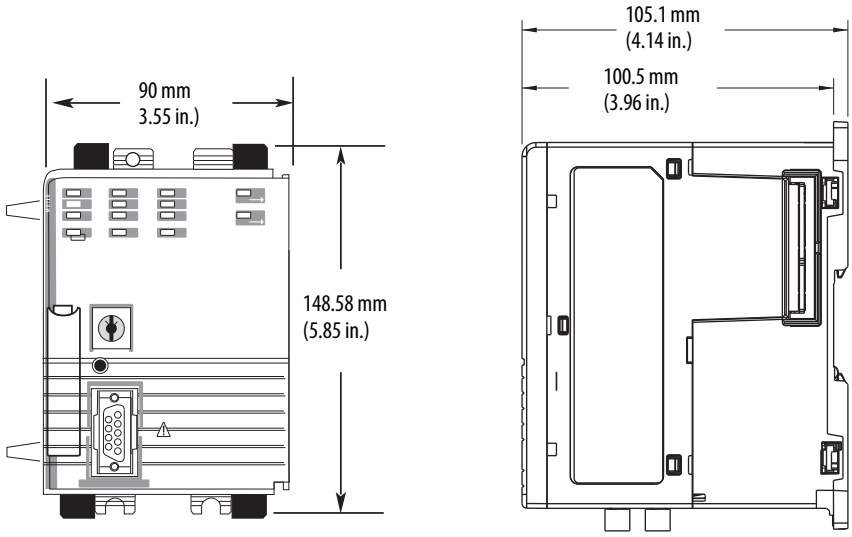

## 1768 Slot Numbering



## 1768-L43, 1768-L45 CompactLogix Dimensions




## 1768-L43S, 1768-L45S CompactLogix Dimensions



# Controller Memory Use

These equations provide an estimate of the memory needed for a controller. These numbers are rough estimates.

| | | | |
|---|---|---|---|
| Controller tasks | _____ * 4000 | = | _____ bytes (minimum 1 task) |
| Digital I/O points | _____ * 400 | = | _____ bytes |
| Analog I/O points | _____ * 2600 | = | _____ bytes |
| DeviceNet modules[1] | _____ * 7400 | = | _____ bytes |
| Other communication modules[2] | _____ * 2000 | = | _____ bytes |
| Motion axes | _____ * 8000 | = | _____ bytes |
| FactoryTalk alarm instruction | _____ * 1000 | = | _____ bytes (per alarm) |
| FactoryTalk subscriber | _____ * 10000 | = | _____ bytes |

(1) The first DeviceNet module is 7400 bytes. Additional DeviceNet modules are 5800 bytes each.

(2) Count all the communication modules in the system, not just those in the local chassis. This includes device connection modules, adapter modules, and ports on PanelView terminals.

Reserve 20…30% of the controller memory for future expansion.

# Controller Compatibility

Your controller can control and communicate with other devices, including the following:

- Control Distributed I/O Modules
- Control Safety I/O Modules
- Communicate with Display Devices
- Communicate with Other Controllers
- Communicate with Other Communication Devices

## Control Distributed I/O Modules

The controller can control these distributed I/O modules.

| I/O Modules | CompactLogix 5370<br>1768-ENBT<br>1769-L23Ex<br>1769-L32E, 1769-L35E<br>EtherNet/IP Network[1] | 1768-CNB, 1768-CNBR<br>1769-L32C, 1769-L35CR<br>ControlNet Network | CompactLogix 5370[2]<br>1769-SDN<br>DeviceNet Network[3] [4] |
|---|---|---|---|
| **Chassis-based I/O** | | | |
| 1746 SLC™ I/O | No | No | No |
| 1756 ControlLogix® I/O | Yes | Yes | Yes |
| 1769 Compact I/O | No | No | Yes |
| 1771 Universal I/O | No | No | No |
| **In-Cabinet I/O** | | | |
| 1734 POINT I/O | Yes | Yes | Yes |
| 1734D POINTBlock I/O | Yes | Yes | Yes |
| 1790, 1790D, 1790P CompactBlock™ LDX I/O | No | No | Yes |
| 1791D, 1791P, 1791R CompactBlock I/O | No | No | Yes |
| 1794 FLEX™ I/O | Yes | Yes | Yes |
| 1797 FLEX Ex™ I/O | Yes | Yes | No |
| **On-Machine I/O** | | | |
| 1732 ArmorBlock® I/O | Yes | No | Yes |
| 1738 ArmorPoint® I/O | Yes | Yes | No |
| 1792D ArmorBlock MaXum™ I/O | No | No | Yes |
| 1799 Embedded I/O | No | No | Yes |

(1) A non-EtherNet/IP CompactLogix controller requires a 1761-NET-ENI interface to connect to an EtherNet/IP network. This interface is only a messaging bridge.

(2) The 1769-L16ER-BB1B, 1769-L18ER-BB1B, and 1769-L18ERM-BB1B controllers cannot access a DeviceNet network and, therefore, cannot control distributed I/O modules on a DeviceNet network.

(3) To control I/O, use a 1769-SDN scanner to connect the controller to the DeviceNet network.

(4) The 1769-SDN does not support safety communications to Guard I/O modules on a DeviceNet network.

## Control Safety I/O Modules

The Compact GuardLogix controller can control these safety I/O modules in a safety system.

| I/O Modules | EtherNet/IP | ControlNet |
|---|---|---|
| 1791ES CompactBlock Guard I/O™ | Yes | No |
| 1734 Point Guard I/O | Yes | No |

## Communicate with Display Devices

The controller can communicate with these display devices.

| Display Devices | EtherNet/IP Network[1] | ControlNet Network | DeviceNet Network[2] | RS-232 (DF1) Network | DH-485 Network |
|---|---|---|---|---|---|
| **Industrial Computers** | | | | | |
| Rockwell Automation industrial computers (all)[3] | Yes | Yes | Yes | Yes | Yes |
| **Graphic Terminals** | | | | | |
| PanelView™ Plus and PanelView CE terminals | Yes | Yes | Yes | Yes | Yes |
| PanelView standard terminals | Yes | Yes | Yes | Yes | Yes |
| PanelView e terminals | No | No | No | No | No |
| **Message Displays** | | | | | |
| InView™ message displays | Yes | Yes | Yes | Yes | Yes |

(1) A non-EtherNet/IP CompactLogix controller requires a 1761-NET-ENI interface to connect to an EtherNet/IP network. This interface is only a messaging bridge.
(2) For DeviceNet access, use either a 1769-SDN scanner (control I/O and send/receive messages) or a 1761-NET-DNI interface (messaging bridge).
(3) Includes: Rockwell Automation integrated display rotating media (HDD) and solid state (SSD) computers, Rockwell Automation non-display computers, and Rockwell Automation integrated display computers with keypad.

## Communicate with Other Controllers

The controller can communicate with these programmable controllers.

| Controller | EtherNet/IP Network[1] | ControlNet Network | DeviceNet Network[2] | RS-232 (DF1) Network | DH-485 Network |
|---|---|---|---|---|---|
| 1756 ControlLogix<br>1756 GuardLogix | Yes | Yes | Yes | Yes | Yes |
| CompactLogix 5370 | Yes | No | Yes[3] | No | Yes[4] |
| 1768-L4*x* CompactLogix | Yes | Yes | Yes | Yes | Yes |
| 1769-L3*x* CompactLogix | Yes | Yes | Yes | Yes | Yes |
| 1769-L23*x* CompactLogix | Yes | No | Yes | Yes | Yes |
| 1789 SoftLogix™ 5800 | Yes | Yes | Yes | Yes | No |
| 1794 FlexLogix™ | Yes | Yes | Yes | Yes | Yes |
| PowerFlex® with DriveLogix™ | Yes | Yes | Yes | Yes | Yes |
| 1785 PLC-5® | Yes[5] [6] | Yes | Yes[7] | Yes | — |
| 1747 SLC | Yes[8] | Yes | Yes[4] | Yes | Yes |
| 1761 MicroLogix™ | Yes | No | Yes[4] | Yes | Yes |
| 1762 MicroLogix | Yes | No | Yes[4] | Yes | Yes |
| 1763 MicroLogix | Yes | No | Yes[4] | Yes | Yes |
| 1764 MicroLogix | Yes | No | Yes[4] | Yes | Yes |
| 1772 PLC-2® | — | — | — | Yes | — |

| Controller | EtherNet/IP Network[1] | ControlNet Network | DeviceNet Network[2] | RS-232 (DF1) Network | DH-485 Network |
|---|---|---|---|---|---|
| 1775 PLC-3® | — | — | — | Yes | — |
| 5250 PLC-5/250 | — | — | No | Yes | — |

(1) A non-EtherNet/IP controller requires a 1761-NET-ENI interface to connect to an EtherNet/IP network. This interface is only a messaging bridge.

(2) In the CompactLogix system, use either a 1769-SDN scanner (control I/O and send/receive messages) or a 1761-NET-DNI interface (messaging bridge).

(3) The 1769-L16ER-BB1B, 1769-L18ER-BB1B, and 1769-L18ERM-BB1B controllers cannot access a DeviceNet network and, therefore, cannot communicate with other controllers on a DeviceNet network.

(4) The CompactLogix 5370 controllers do not have an embedded serial port. You must add external modules to communicate over a DH-485 network.

(5) The Ethernet PLC-5 controller must be series C, firmware revision N.1 or later; series D, firmware revision E.1 or later; or series E, firmware revision D.1 or later.

(6) The 1785-ENET Ethernet communication interface module must be series A, firmware revision D or later.

(7) The PLC-5, SLC, and MicroLogix processors appear as I/O points to the Logix controller. Use the appropriate DeviceNet interface for the controller.

(8) Use a 1747-L55*x* controller with OS501 or later.

## Communicate with Other Communication Devices

The controller can communicate with these communication devices.

| Communication Device | EtherNet/IP Network[1] | ControlNet Network | DeviceNet Network[2] |
|---|---|---|---|
| Linking device (ControlLogix controllers only) | 1788-EN2DN | 1788-CN2DN<br>1788-CN2FF | 1788-EN2DN[3]<br>1788-CN2DN |
| PCMCIA card | — | 1784-PCC | 1784-PCD |
| PCI card | — | 1784-PCIC<br>1784-PCICS | 1784-PCID<br>1784-PCIDS<br>1784-CPCIDS |
| Drives SCANport™ module | — | 1203-FM1<br>1203-FB1[4] | — |
| Communication module | — | 1203-CN[5]<br>1770-KFC15<br>1770-KFCD15<br>1747-KFC15 | 1770-KFD<br>1770-KFG |
| Communication card | — | 1784-PKTCS<br>1784-KTCS<br>1784-KTCX15 | 1784-PKTX<br>1784-PKTXD |
| USB communication device | — | 1784-U2CN | 1784-U2DN |

(1) A non-EtherNet/IP controller requires a 1761-NET-ENI interface to connect to an EtherNet/IP network. This interface is only a messaging bridge.

(2) In the CompactLogix system, use either a 1769-SDN scanner (control I/O and send/receive messages) or a 1761-NET-DNI interface (messaging bridge).

(3) The 1788-EN2DN does not support safety communications (CIP Safety).

(4) Use a CIP generic MSG instruction to communicate with the 1203-FM1 SCANport module on a DIN rail that is remote to the controller. The remote DIN rail also requires a 1794-ACN15 or 1794-ACNR15 ControlNet adapter module.

(5) Use the generic module configuration to configure the 1203-CN1 module and a CIP generic MSG instruction to communicate with the module.

# Controller Connections

A CompactLogix system uses the connection types to establish communication links between devices:

- Controller-to-local I/O modules or local communication modules
- Controller-to-remote I/O or remote communication modules
- Controller-to-remote I/O (rack-optimized) modules
- Produced and consumed tags
- Messages
- Controller access by RSLogix 5000 programming software
- Controller access by RSLinx software for HMI or other applications

You indirectly determine the number of connections the controller uses by configuring the controller to communicate with other devices in the system. The limit of connections may ultimately reside in the communication module you use for the connection. If a message path routes through a communication module, the connection related to the message also counts towards the connection limit of that communication module.

## CompactLogix 5370 Controller Ethernet Node Limits and Connections

When designing a CompactLogix 5370 control system, you must consider the following:

- Maximum number of Ethernet nodes available for your controller's project
- Connections

The controller you select determines the number of Ethernet nodes available.

| Cat. No. | Ethernet Nodes Supported |
|---|---|
| 1769-L16ER-BB1B | 4 |
| 1769-L18ER-BB1B | 8 |
| 1769-L18ERM-BB1B | |
| 1769-L30ER | 16 |
| 1769-L30ERM | |
| 1769-L30ER-NSE | |
| 1769-L33ER | 32 |
| 1769-L33ERM | |
| 1769-L36ERM | 48 |

All CompactLogix 5370 controllers support 256 CIP connections and 120 TCP/IP connections.

## 1769-L23*x* CompactLogix Connections

The controller you select determines the connections for I/O and messages.

| Controller | Supports |
|---|---|
| 1769-L23EQB1B | 32 CIP connections<br>8 TCP/IP connections |
| 1769-L23EQBFC1B | |

The total connection requirements for a 1769 CompactLogix system include both local and remote (distributed) connections. The controller supports 100 connections. The available remote connections depend on the network interface.

## 1769-L3*x* CompactLogix Connections

The controller you select determines the connections for I/O and messages.

| Controller | Supports |
|---|---|
| 1769-L32C<br>1769-L35CR | 32 CIP connections |
| 1769-L32E<br>1769-L35E | 32 CIP connections<br>32 TCP/IP connections |

The total connection requirements for a 1769 CompactLogix system include both local and remote (distributed) connections. The controller supports 100 connections. The available remote connections depend on the network interface.

## 1768-L4*x* CompactLogix Connections

The communication module you select determines the connections for I/O and messages.

| Communication Module | Supports |
|---|---|
| 1768-ENBT<br>1768-EWEB | 128 CIP connections<br>64 TCP/IP connections |
| 1768-CNB<br>1768-CNBR | 48 CIP connections |

The total connection requirements for a 1768 CompactLogix system include both local and remote (distributed) connections. The controller supports 250 connections. The available remote connections depend on the network interface.

# Determine Total Connection Use

The total connection requirements for a CompactLogix system include both local and remote (distributed) connections. The 1769-L23*x* and 1769-L3*x* controllers support 100 connections; the 1768-L4*x* controllers supports 250 connections. The available remote connections depends on the network interface.

| Connection Type | Device Quantity | Connections per Device | Total Connections |
|---|---|---|---|
| Remote ControlNet communication module<br>Configured as a direct (none) connection<br>Configured as a rack-optimized connection | | 0 **or**<br>1 | |
| Remote I/O module over a ControlNet network (direct connection) | | 1 | |
| Remote Ethernet communication module<br>Configured as a direct (none) connection<br>Configured as a rack-optimized connection | | 0 **or**<br>1 | |
| Remote I/O module over an EtherNet/IP network (direct connection) | | 1 | |
| Remote device over a DeviceNet network<br>(accounted for in rack-optimized connection for local 1756-DNB module) | | 0 | |
| Produced tag and first consumer | | 2 | |
| Each additional consumer | | 1 | |
| Consumed tag | | 1 | |
| Cached message | | 1 | |
| Message | | 1 | |
| RSLinx Enterprise subscriber (16 maximum) | | 1 | |
| **Total** | | | |

# CompactLogix Controller Accessories

## Memory Cards

Memory cards offer nonvolatile memory to permanently store a user program and tag data on a controller. Through RSLogix 5000 software, you can manually trigger the controller to save to or load from nonvolatile memory or configure the controller to load from nonvolatile memory on powerup.

CompactLogix 5370 controllers come with a 1784-SD1 Secure Digital (SD) card installed. You can order a 1784-SD2 SD card separately for additional nonvolatile memory with the CompactLogix 5370 controllers.

All other CompactLogix controllers, that is, all CompactLogix controller catalog numbers except those included in the CompactLogix 5370 controllers, offer a CompactFlash card as a nonvolatile memory option. You install the CompactFlash card in a socket on the controller. Through RSLogix 5000 software, you can manually trigger the controller to save to or load from nonvolatile memory or configure the controller to load from nonvolatile memory on powerup.

**Table 28 - Technical Specifications - 1784-CF64, 1784-CF128, 1784-SD1, 1784-SD2**

| Attribute | 1784-CF64 | 1784-CF128 | 1784-SD1 | 1784-SD2 |
|---|---|---|---|---|
| Memory | 64 MB | 128 MB | 1 GB | 2 GB |
| Supported controllers | 1769 packaged controllers<br>1769 modular controllers<br>1768 controllers | | CompactLogix 5370 controllers | |
| Weight, approx. | 14.2 g (0.5 oz) | | 1.76 g (0.062 oz) | |

**Table 29 - Environmental Specifications - 1784-CF64, 1784-CF128, 1784-SD1, 1784-SD2**

| Attribute | 1784-CF64, 1784-CF128, 1784-SD1, 1784-SD2 |
|---|---|
| Temperature, operating<br>IEC 60068-2-1 (Test Ad, Operating Cold),<br>IEC 60068-2-2 (Test Bd, Operating Dry Heat),<br>IEC 60068-2-14 (Test Nb, Operating Thermal Shock) | -25…70 °C (-13…158 °F) |
| Temperature, storage<br>IEC 60068-2-1 (Test Ab, Unpackaged Nonoperating Cold),<br>IEC 60068-2-2 (Test Bb, Unpackaged Nonoperating Dry Heat),<br>IEC 60068-2-14 (Test Na, Unpackaged Nonoperating Thermal Shock) | -40…85 °C (-40…185 °F) |
| Relative humidity<br>IEC 60068-2-30 (Test Db, Unpackaged Damp Heat) | 5…95% noncondensing |
| Vibration<br>IEC 60068-2-6 (Test Fc, Operating) | 2 g @ 10…500 Hz |
| Shock, operating<br>IEC 60068-2-27 (Test Ea, Unpackaged Shock) | 30 g |
| Shock, nonoperating<br>IEC 60068-2-27 (Test Ea, Unpackaged Shock) | 50 g |
| Emissions<br>CISPR 11 | Group 1, Class A |
| ESD immunity<br>IEC 61000-4-2 | 6 kV contact discharges<br>8 kV air discharges |
| Radiated RF immunity<br>IEC 61000-4-3 | 10V/m with 1 kHz sine-wave 80% AM from 80…2000 MHz<br>10V/m with 200 Hz 50% Pulse 100% AM @ 900 MHz<br>10V/m with 200 Hz 50% Pulse 100% AM @ 1890 MHz<br>3V/m with 1 kHz sine-wave 80% AM from 2000…2700 MHz |

**Table 30 - Certifications - 1784 Memory Cards**

| Certification[1] | 1784-CF64, 1784-CF128, 1784-SD1, 1784-SD2 |
|---|---|
| CE | European Union 2004/108/EC EMC Directive, compliant with:<br>• EN 61000-6-4; Industrial Emissions<br>• EN 61326-1; Meas./Control/Lab., Industrial Requirements<br>• EN 61000-6-2; Industrial Immunity<br>• EN 61131-2; Programmable Controllers (Clause 8, Zone A & B) |
| C-Tick | Australian Radiocommunications Act, compliant with: AS/NZS CISPR 11; Industrial Emissions |
| KC | Korean Registration of Broadcasting and Communications Equipment, compliant with:<br>• Article 58-2 of Radio Waves Act, Clause 3 |

(1) When marked. See the Product Certification link at http://www.ab.com for Declarations of Conformity, Certificates, and other certification details.

## 1769 CompactLogix Batteries

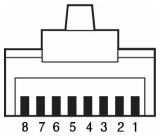
The 1769-L23*x* and 1769-L3*x* controllers come with one 1769-BA lithium battery.

Neither the 1768 controllers nor the CompactLogix 5370 controllers require a battery. The controllers use internal flash memory to store its program during shutdown. Energy stored in the system maintains controller power long enough to store the program to internal flash memory but not the external CompactFlash card nor SD card respectively).

**Table 31 - Technical Specifications - 1769-BA**

| Attribute | 1769-BA |
|---|---|
| Description | Lithium battery (0.59 g) |
| CompactLogix controllers | 1769-L23-QBFC1B, 1769-L23E-QB1B, 1769-L23E-QBFC1B<br>1769-L31<br>1769-L32C, 1769-L35CR<br>1769-L32E, 1769-L35E |

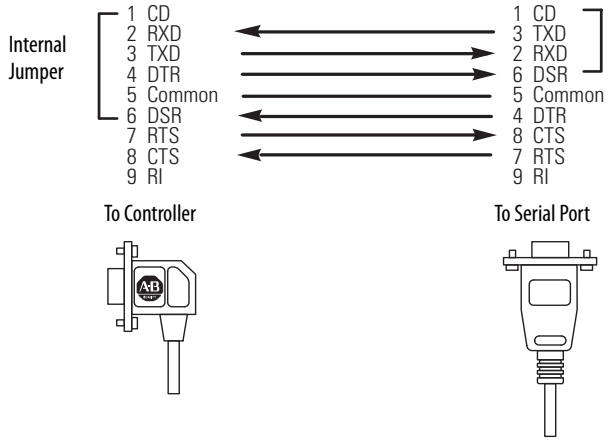
## Ethernet Communication Cables




| Connector Number | Color | 1585J-M8xBJM-2 | 1585J-M4TBJM-2 |
|---|---|---|---|
| 1 | White/Orange | TxData + | |
| 2 | Orange | TxData - | |
| 3 | White/Green | Recv Data + | |
| 4 | Blue | Unused | - |
| 5 | White/Blue | Unused | - |
| 6 | Green | Recv Data - | |
| 7 | White/Brown | Unused | - |
| 8 | Brown | Unused | - |

| Attribute | Value |
|---|---|
| Connector type | RJ45 Male to RJ45 Male |
| Connector angle | Straight-through |
| Length | Varies by catalog number |

## Serial Communication Cables




| Attribute | 1756-CP3 | 1747-CP3 |
|---|---|---|
| Connector type | Female 9-pin D-shell | |
| Connector angle | Right angle connector to controller, straight to serial port | |
| Length | 3 m (118 in.) | |

## Notes:

## Notes:

# Important User Information

Solid-state equipment has operational characteristics differing from those of electromechanical equipment. Safety Guidelines for the Application, Installation and Maintenance of Solid State Controls (publication SGI-1.1 available from your local Rockwell Automation sales office or online at http://www.rockwellautomation.com/literature/) describes some important differences between solid-state equipment and hard-wired electromechanical devices. Because of this difference, and also because of the wide variety of uses for solid-state equipment, all persons responsible for applying this equipment must satisfy themselves that each intended application of this equipment is acceptable.

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